

RESEARCH PROGRAMS
1989-1990
Cosmic/Sensory Research

| | <u>1989</u> | <u>1990</u> |
|------------------------------|-------------|-------------|
| <u>Professional Services</u> | | |
| Dr. Mangan | \$180.0 | \$118.5 |
| Dr. Eysenck | 175.0 | 78.6 |
| Dr. Harley | 32.0 | 33.1 |
| Dr. Ashby/Dr. Nosofsky | <u>0.0</u> | <u>72.4</u> |
| Total | \$387.0 | \$302.6 |

Consulting

| | | |
|---------------|------------|------------|
| Dr. Eysenck | \$ 3.3 | \$ 3.4 |
| Dr. Haier | 1.9 | 2.0 |
| Dr. Harley | 2.9 | 3.0 |
| Dr. Mangan | 3.8 | 4.0 |
| Dr. Warburton | 3.8 | 4.0 |
| Dr. Frijters | 3.3 | 3.4 |
| Dr. Falmagne | 1.9 | 2.0 |
| Dr. Nosofsky | 1.9 | 2.0 |
| Dr. Ashby | 1.9 | 2.0 |
| Dr. Mullen | <u>5.3</u> | <u>5.5</u> |
| Total | \$30.0 | \$31.3 |

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**PM USA R&D
1989-1990 Consulting Relationships**

| Program Description | Consultant | Budgeted Amount (\$000) | |
|--|------------------------|-------------------------|--------|
| | | 1989 | 1990 |
| ANSI | R. Dawson | \$ 4.0 | \$ 4.2 |
| Regulatory Agencies | J. Stoffberg | 4.8 | 0.0 |
| Chemistry and Biochemistry | A. Wolf | 12.0 | 12.5 |
| Analytical Chemistry | F. Hawkrige | 2.5 | 2.0 |
| Localization of Nicotine | P. Echlin | 9.2 | 6.8 |
| Spectroscopy/IR Methods Development | R. Jacobsen | 0.0 | 5.3 |
| Elemental Analysis | T. Rains | 1.5 | 0.0 |
| Wet Chemistry | Cumberland Consultants | 0.0 | 4.7 |
| Sequencing/Protein Isolation Separation Techniques | | 6.5 | 7.4 |
| Analysis Development | Dr. Berntson | 1.5 | 2.0 |
| Electrophysiology | Dr. G. Kobal | 2.2 | 0.0 |
| Waveform Analysis | | 0.0 | 1.5 |
| Cigarette Paper Properties | Dr. Mattina | 24.0 | 6.5 |
| Organic Chemistry | | 0.0 | 6.5 |
| Pyrolysis of Cellulose and Paper and Aerosol Formation | Dr. Chum | 0.0 | 4.0 |

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PM USA R&D
1989-1990 Consulting Relationships
(Continued)

| Program Description | Consultant | Budgeted Amount (\$000) | |
|----------------------------------|---------------|-------------------------|--------|
| | | 1989 | 1990 |
| Nicotine Removal and Destruction | Dr. Fair | \$ 0.0 | \$ 4.0 |
| Surface Chemistry | Dr. Somorjai | 0.0 | 4.0 |
| Inorganic Chemistry | Dr. Schleich | 0.0 | 7.0 |
| Supercritical Adsorber Columns | F. Seibert | 0.0 | 4.2 |
| Chemistry | D. Sawyer | 8.0 | 0.0 |
| Optical Components | A. Vanderlugt | 7.0 | 7.3 |
| Optical Processing | D. Casasent | 4.0 | 0.0 |
| Processing System | Dr. Fazzina | 0.0 | 12.5 |
| Alternate Adsorber | F. Seibert | 4.0 | 0.0 |
| Hydrate Technology | Dr. Sloan | 0.0 | 2.0 |
| Separator Design | Dr. Zenz | 0.0 | 11.0 |
| Structure Set | | 0.0 | 4.0 |
| Process Modeling | | 0.0 | 8.0 |
| Corrosion Research | | 3.0 | 0.0 |
| Continuous Process | M. W. Kellogg | 0.0 | 25.0 |
| Extrusion Sigma/Beta | APV Baker | 0.0 | 6.6 |

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PM USA R&D
1989-1990 Consulting Relationships
(Continued)

| Program Description | Consultant | Budgeted Amount (\$000) | |
|----------------------|---------------------|-------------------------|-------------|
| | | 1989 | 1990 |
| Supercritical Fluids | University of Texas | \$ 0.0 | \$ 15.1 |
| Binder Mechanisms | Dr. Ruben | 6.3 | 0.0 |
| Process Engineering | Notre Dame | <u>0.0</u> | <u>11.0</u> |
| Total | | \$100.5 | \$185.1 |

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VISITING SCIENTISTS

1990

| <u>Scientist</u> | <u>Program</u> | <u>Amount</u> |
|------------------|---|------------------|
| Dr. Wegscheider | Optimization in Analytical Chemistry, Chemometrics, Information Theory Related to Analytical Data | \$ 20,000 |
| Dr. Phillips | High Speed Calculation of Complex Physics and Engineering Systems | 60,000 |
| Dr. Pat Bower | Molecular Biologist (Miller Brewing) | 22,055 |
| | TOTAL | \$102,055 |

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Science and Technology Areas Currently Under Development at PM USA R&D

| | |
|---------------------------------|--|
| Molecular Biology | Modification of plant systems to eliminate the production of selected compounds (e.g., Nicotine). |
| Artificial Intelligence Systems | Expert system based computer models. Current work includes cigarette design systems. |
| Catalysts for CO oxidation. | Work with Seton Hall University to develop low temperature catalysts for CO oxidation. |
| Chemical energy sources. | Research at R&D and with N.Y. Polytechnic University to identify new heat sources for the Sigma Program. |
| Ceramic Technologies | Applications of sol-gels as cigarette paper fillers. Ceramic heater materials for the Beta Program. |
| Computer Simulations | Collaboration with Virginia Polytechnic Institute and State University to provide new insights into aerosol formation and the role of hydrates in tobacco expansion. Heat and mass transfer modeling for the Sigma Program. Flow and process simulations |
| Computer Technologies | High speed computing and machine communication. High performance workstations. Electronic information systems. Optical fiber networks. |
| Consumer Behavior Prediction | Psychophysical models of subjective response. Theories of market dynamics. Consumer testing methods. |
| Electrochemical Energy Sources | High energy/power density sources for the Beta Program. |
| Encapsulation | Release systems for menthol and/or flavors. |
| Fluid Jets | Accurate, high speed application of flavors or adhesives. |
| Monoclonal Antibodies | Rapid analysis for chemical and biochemical agents. |

| | |
|----------------------------|--|
| Natural Binders | Improved binder systems for tobacco or sheet materials. |
| Neural Computing | Neural network applications to complex mapping situations. (e.g. consumer preference from demographics) |
| Neutron Radiography | Thermal neutron imaging of cigarettes & smoke for product and/or combustion studies. |
| Nuclear Magnetic Resonance | High resolution tomographic imaging. Multiple pulse analysis techniques. |
| Optical Inspection | High speed imaging and analysis for real time product inspection. Work with Carnegie Mellon University on measurement of size, texture, connectedness, and color of disordered structures. Methods of foreign matter identification. |
| Paper | Development, using facilities at the University of Maine and Western Michigan University, of new paper and paper additive processes for the Paper Program. |
| Remote Sensing | Non-contact sensing of process and/or tobacco streams. |
| Separation Technologies | Supercritical fluid, membrane, fixed and fluidized bed separations of nicotine and/or minor alkaloids. |
| Supersonic Molecular Jets | Fundamental studies with Colorado State University of aerosol formation mechanisms and growth and chemistry of small organic clusters. |
| Tobacco Expansion. | R&D work on expansion mechanisms and technologies for improved expansion processes. |

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Technology Assessment

The objectives of the R&D Technology Assessment effort remain to (1) define technology related needs, (2) identify areas of science or technology which may satisfy those needs, (3) develop those areas for our use and (4) recommend and facilitate the implementation of the technology. In pursuing those objectives we continue to maintain current awareness of numerous science and technology areas as they develop commercially or at universities. The Technology Assessment Group currently maintains contact with fifteen university departments, in addition to the contacts maintained by the R&D professional staff.

Activity continues in the three previously defined strategic technology areas:

Paper: The R&D Paper Program is making significant contributions to the basic understanding of sidestream smoke generation. During this plan period, the sol-gel work supported by this program is expected to provide new paper fillers for conventional as well as innovative smoking products.

Optical Inspection: The emphasis of the Optical Processing Program is currently on the implementation of commercially available hardware (and PM proprietary software) for on-line pack inspection as well as on-press inspection of printed materials. The recently initiated studies of optically implemented morphology operators are expected to yield technologies for inspecting tobacco filler and strip by the end of this plan period.

Artificial Intelligence: An expert system based cigarette design system has been implemented. This system is expected to contribute to R&D operations by expediting cigarette design operations and, ultimately, by reducing the number of semiworks runs. Neural computing technologies continue to develop rapidly and these have been adapted to PM uses. Recent success with the prediction of consumer response from demographic data suggests valuable applications for this technology during the next five years. The growth of artificial intelligence systems for on-line process control has been slower than anticipated. These may begin to be commercially available by the end of the plan period.

Other areas in which members of the R&D Technology Assessment Group are currently involved include:

Catalysts for CO oxidation: This work may produce PM proprietary catalysts for mainstream smoke or ambient air in 5 to 7 years.

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Chemical energy sources: Currently in use in the Sigma Program.

Computer simulations: Completed studies have enhanced our understanding of humectant systems. Current studies of hydrate and liquid drop formation are expected to make similar basic contributions to expansion and aerosol generation technologies.i

Electrochemical energy sources: These studies will continue to identify and develop energy sources for the Beta Program.

Supersonic Molecular Jet Studies: This work continues to provide basic information about the structure and chemistry during the initial stages of aerosol formation. Work aimed at increased understanding of formation mechanisms shows increasing promise.

Tobacco Expansion: New process design based on improved understanding of hydrate formation, and of blowing and fixing mechanisms is expected to produce improved expansion processes during the next 2 to 3 years.

These and similar programs will be continued into the plan period, with increased emphasis on identifying the specific needs of the R&D Major Programs. Continuing emphasis will be placed on the *implementation* of developed technologies.

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APPENDIX D

Externally Developing Technologies

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SENSOR TECHNOLOGIES

Devices that provide a signal that accurately reflects some process parameter in real time.

Status:

Sensors with greatly improved selectivity, stability, sensitivity, precision, environmental resistance and range are under development at university, government and industrial laboratories. A major driving force for this development is "continuous process" applications in areas such as foods, beverages, materials, pharmaceuticals, chemicals, biochemicals, smelting, refining and waste management. Optical, electrical, acoustical and bio-sensors appear to be developing rapidly. Sensors for the non-visible regions of the electromagnetic spectrum are receiving less emphasis.

Likely Scenario:

The U. S. Department of Commerce projects a world sensor market of \$12B by the year 2000*. In that case we can expect that a multitude of new sensor technologies will become available during this plan period. New sensor technologies will be most readily applicable to liquid, rather than solid streams. Many of them will have short comings in real process situations (variable feedstocks, sensor lifetime, operational complexity, control system compatibility.) However useful new technologies will emerge. Considerations such as efficiency, quality, and inspection of new (novel) products will make these applications important to PM operations. In addition, biosensor development may lead to selective measurements of smoke components in room air and/or to more efficient analytical methods.

Alternate Scenario:

Reduced industry and government support for basic research may slow domestic development of these technologies.

Advances in the understanding of relationships between specific biological activity and chemical compounds could lead to the development of detectors for biological activity.

R&D Response:

We must continue to monitor a wide range of sensor development and to implement valuable technologies early as possible. While some of the new technologies will be directly

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applicable in their off-the-shelf form, many will need to be modified or developed for our uses. We must maintain enough internal activity in these areas to allow development and implementation with minimal learning time. This may be especially true in the case of the more specialized techniques such as biosensors or those using non-visible radiation.

A focused approach to the above activities is recommended. To the extent possible, future applications should be anticipated. Increased emphasis should be placed on establishing pathways and procedures for the smooth implementation of new or existing sensor technologies.

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ANALYTICAL SCIENCE & TECHNOLOGY

(See Also Sensor Technologies)

Methods and apparatus for the detection and measurement of specific chemical compounds-often for the detection and measurement of small concentrations of specific compounds in the presence of high concentrations of other compounds.

Status:

Analytical instrumentation and techniques are becoming progressively more sensitive, selective and specific. Major driving forces for these improvements are increased environmental and health concerns as well as increasing governmental regulation.

Likely Scenario:

Further reductions in the qualitative and quantitative detection limits for trace elements and organic compounds are expected to occur slowly during the plan period.

New instrumentation, software and detectors will make the measurements and identification easier.

The public will become more concerned about trace components in food and smoking products.

Alternate Scenario:

Major, as yet unknown, breakthroughs could lead to a significant stepwise reductions in limits of detection.

Government(s) may impose upper concentration limits on specific cigarette ingredients.

R&D Response:

Our current rate of acquisition of state-of-art analytical knowledge and instrumentation must be maintained. R&D must stay alert to all developments in analytical methodology and maintain readiness to implement those which impact R&D, Operations or defensive needs.

To facilitate the development of analytical strategies, we should seek better understanding of the origins of (and synergies between) the materials we analyze.

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BIOTECHNOLOGY

Modification of the genetic machinery of living cells to alter the chemical or physical nature of the organism or to produce useful biochemicals. The production of high value-added biological products on a commercial scale.

Status:

Biotechnology has produced plant modifications, biosensors, new and efficient separation and purification methods, new or better techniques to produce natural and/or new biochemicals and more efficient bioprocesses. Commercial applications have been hampered by difficulties in controlling large scale bio-processes and making large scale separations. More fundamental problems center on needs for measurement tools and for improved knowledge of cellular processes and protein structure/function relationships.*

Likely Scenario:

Biotechnology markets in pharmaceuticals, foods, flavors, fragrances, agrichemicals, commodities, fuels and pollution abatement are estimated by the U.S. Department of Commerce to reach a world market of \$40B by the year 2000*.

The market for modified tobacco plants is probably too small and fragmented to attract commercial interest outside of tobacco companies. However the external development of biopesticides, drought resistant plants or "natural" anti-suckering agents may contribute to tobacco quality and/or production. Japan Tobacco Inc. is known to be developing a broad base of biotechnology, not necessarily related to tobacco or smoking product applications.

Recent demonstrations of the use of bacteria to install traits of interest into specific plants suggest the possibility of introducing or inhibiting a specific physical characteristic or a chemical component. Since the bacteria die with the plants, the traits are not passed on to future generations and no permanent alteration of the environment is effected. Thus traits of interest could be installed by the farmer, using a spraying operation. Further development of this technology is highly probable.

Alternate Scenario:

Breakthroughs in the fundamental understanding of biochemical structure/function relationships could produce radical changes in the nature and effectiveness of biotechnology.

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PM Response:

As one of the fastest growing areas of science, biotechnology demands our continuing attention. R&D is pursuing the use of anti-sense techniques to reduce or eliminate the expression of specific products (alkaloids) in tobacco. We are actively investigating the new results (above) in the use of bacteria or viruses for the transient expression of desirable traits (reduced alkaloids, improved flavor.) Work is also in progress on the enzyme degradation of nicotine in gas or aqueous streams.

Members of the Biochemical Research Division continually monitor developments in biotechnology. These include homologous recombination (gene alteration), the use of microorganisms to introduce biopesticides and methods of gene introduction such as "gene guns," or microinjection techniques.

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HIGH PERFORMANCE COMPUTING

The design and development of computer architectures for rapid and efficient processing. Development of ways to program large systems to perform complex tasks.

Status:

Continuing and significant advances in the areas of software engineering, microelectronics, optoelectronics, data structures and algorithms, numeric and symbolic methods and computational science and technology have pushed computer performance to unanticipated levels. High performance computers can now address large numerical and scientific problems such as image processing, weather forecasting, hydrodynamics, aerodynamics, computational chemistry and high energy physics. Current problems lie in reliability, accuracy and automated development. Software is difficult to specify and design, development is costly and time consuming and it is difficult to test for all failure modes that might occur during use*.

Concurrently with advances in mainframe machines, desktop computers have evolved which offer performance approaching that of the mainframes of a few years ago. Networks of these "workstations" are creating a new working environment for technical personnel.

Likely Scenario:

Rapid advances in computer technology are expected to continue. The U.S.D.O.C. estimates a \$100B world market by the year 2000*. Low cost "supercomputer modules" may be available within two years. Existing applications programs will be able to solve previously intractable problems in such areas of machine vision, product design, process simulation and complex numerical calculations. Given the slower pace of applications development, a moderate number of new solutions will be developed and applied to current problems. The application of real time process control will be limited by our understanding of the relationships between sensor information and control parameters, rather than by computational speed. Non-Van Neumann (fuzzy logic, neural computing) approaches will continue to grow in importance as computational speed increases. While optical coupling will be necessary for high speed processors, optical computing (optical transform operations, optical logic) will progress slowly and will find its primary use in military applications. Computer aided cigarette design will continue to improve and will be widely available by the end of the plan period.

Advances in desktop workstations are expected to continue, further enhancing the ability of technical personnel to control powerful local computing environments as well as to communicate with other workstations or mainframe machines.

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Alternate Scenario:

In principle, the field of optical computing offers extreme speed and the possibility of creating complex architectures with minimal crosstalk. If "conventional" architectures fail to continue their rapid progress, increased emphasis will be placed upon optical computing. Such emphasis could also result from a breakthrough in monolithic optical technology.

R&D Response:

The monitoring and application of technologies such as process simulation, machine vision, computational physics/chemistry neural simulation and artificial intelligence must be continued, and supported by high performance computing capability.

A more focused approach should be taken to the definition and analysis of computational problems in terms of the potential benefits from their solution. The growth of workstation environments at R&D should be continued when their use makes "business sense." Additional effort should be devoted to understanding the relationships between sensor information and control parameters. Opportunities to apply this understanding should be addressed in collaboration with other departments.

Progress in the optical processing/computing areas should be followed closely. R&D should maintain enough activity in these technologies to be able to quickly understand and implement them should the need arise.

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INNOVATIVE SMOKING ARTICLES

Articles which employ novel approaches to offer the satisfaction of smoking, accompanied by perceived health or social benefits.

Status:

An innovative article employing a carbon heat source was introduced in test market by R. J. Reynolds Tobacco and subsequently withdrawn. Reynolds has indicated plans to introduce these articles in Europe. Other tobacco companies are investigating this area. Non-tobacco companies (including Proctor and Gamble) may also have an interest.

Likely Scenario:

It is likely that either a tobacco company or a drug company will introduce an innovative smoking or aerosol inhalation device to the market during the plan period. It could be reasonably successful.

Alternate Scenarios:

Consumer product or drug companies may (1) be unable to develop an acceptable product or (2) judge the market to be unacceptable. In that case, there will be no introductions of novel devices.

Or, several consumer product or consumer electronics companies may introduce devices, making the products a "commodity."

R&D Response:

We must continue our product development activities aimed at initial introductions in 1992-93 and at the marketing of a technologically advanced "ultimate" product by 1999.

We must also continue careful monitoring of developments to avoid technical or business surprises. Technologies for small electrical storage devices with high energy/power capability and for the high speed manufacture of heater arrays will be particularly important.

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FARM AUTOMATION

Mechanized farm practices designed to reduce labor requirements.

Status:

Agricultural economics increasingly dictates a need for farm consolidation and increased mechanization (reduced labor.)

Likely Scenario:

Increased automation will be necessary to maintain the profitability of tobacco farming. Automated mechanical harvesting is likely to increase the quantity of poorly graded or mixed tobacco offered for auction. Thus PM would lose some of its capability to purchase well graded (by stalk position) tobacco. This may reduce our control of blend components for cigarette making.

Alternate Scenario:

Poorly designed or applied automated equipment could result in a general reduction in tobacco quality.

R&D Response:

We are currently working in a cooperative program with state and federal tobacco researchers and extension personnel to keep them aware of the need for quality, well graded tobaccos.

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OPTICAL INSPECTION TECHNOLOGIES

Technologies which allow materials, products and packaging to be inspected at manufacturing speeds for defects that would be visually apparent to an observer, given sufficient observation time.

Status:

Only a few years ago the real time inspection of our products was not feasible using digital imaging technology. At that time optical processing (using optical transforms and/or optical computing) was the technology of choice. However recent developments in high speed cameras, high volume information storage, high speed computing and computing algorithms have made on-line package inspection possible and placed individual cigarette and on-press print inspection within reach. The current technical challenges center on the reproducible and stable presentation of objects to the camera and on the development of very high resolution, high speed cameras or electrooptic scanners.

Likely Scenario:

Developments in digital imaging are expected to continue, driven by an estimated \$5B world market (\$3.3-4.3B U.S.) by the year 2000*. We anticipate the installation of pack inspection systems on all modules by 1992. Imaging and processing capabilities for print web and 100% on line cigarette inspection are expected to be available by 1994. Adaptation of these developments to our applications will produce significant benefits in quality and machine utilization.

Developments in morphological image processing are expected to lead to on-line methods of characterizing tobacco streams (size, shape, texture, color) and the identification of foreign materials.

Alternate Scenarios:

Very high speed inspection is needed by relatively few industries (cigarettes, beverages, pharmaceuticals and printing.) These markets may not be sufficient to motivate commercial development of high speed systems.

Unexpected technical barriers may preclude the attainment of the required speeds and resolution by digital technologies - or unexpected breakthroughs may occur in optical processing or computing.

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R&D Response:

Continued or expanded effort is needed to achieve the goal of 100% pack inspection and to develop or adapt high speed imaging and processing to our needs. Close coordination between R&D and Engineering will be necessary.

The development of digital imaging technologies must be monitored closely, as must the business progress of the (generally small) vision system vendors. We should stay abreast of progress in the optical processing/computing areas in the event that optical implementations prove necessary or desirable.

Recently initiated sponsored research in morphological processing (Carnegie Mellon University) should be followed closely to determine the potential of this technology for tobacco inspection.

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AUTOMATION AND PROCESS CONTROL

Technologies to carry out tasks or operate machinery with minimal dependence on human operators.

Status:

Over the past ten years, progress in these technologies has been slower than anticipated. However increasing needs to reduce manpower, increase quality and improve machine utilization are leading to more emphasis in the area. At the same time developments in computer science and technology have made successful real time implementations more feasible.

Likely Scenario:

During the plan period, controller and sensor technologies are expected to mandate "host" computer strategies. Real time data collection will become routine with statistical processing done on a plant wide basis (host environment.) On-line applications of artificial intelligence, neural processors and fuzzy logic process control will develop slowly and may become significant near the end of the plan period.

Alternate Scenarios:

A significant process control need (such as the manufacture of novel smoking articles) may develop requiring us to adapt or develop currently emerging technologies.

Aa significant breakthrough in process control theory or technology may occur to expedite the appearance of new commercial equipment.

Developments in smart sensors and controllers (local processors) may provide flexibility and simplicity, but no central control or statistical use.

R&D Response:

Developments should be closely monitored and evaluated for our applications as early as possible. Smart sensors, artificial intelligence and neural systems are currently under study. It is important that we develop better mechanisms for understanding and evaluating process control problems and implementing solutions.

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BIODEGRADABLE AND RECYCLABLE MATERIALS

Discarded biodegradable product and packaging materials are converted to environmentally acceptable physical and/or chemical forms by the action of sunlight or natural microorganisms. Recyclable materials may be reprocessed for further use.

Status:

Packaging is seen by the public as a major factor in the growing solid waste disposal crisis. Steadily increasing public concern has resulted in significant increases in research efforts to produce recyclable and biodegradable polymer materials. Biodegradable materials may be converted to a more dispersible physical form by microbial action (as by incorporating starch), substantially metabolized (as in the case of new cellulose-based materials) or degraded by sunlight or enzymatic action to more acceptable chemical forms. While most polymers can, in principle, be reprocessed for further use, problems arise in the identification and sorting of waste materials or, in the case of layered or co-polymers, in separating mixtures into their component parts. While products in all categories are beginning to appear, many of these efforts are in their initial stages.

Likely Scenario:

Continued rapid growth in public demand for biodegradable or recyclable materials is expected, fueled by environmental and conservation concerns. More than 70% of landfills are expected to be closed within five years. Anti-smoking forces may support demands for biodegradable films, packages and filters. Thus biodegradable/recyclable package and product components will become important product attributes during the plan period.

Alternate Scenario:

National or state legislation may be passed requiring the use of degradable or recyclable materials and/or restricting the release of specific packaging components to the environment.

R&D Response:

A coordinated program to monitor all developments in this area is essential. New developments should be identified at the earliest stage and developed for our use as quickly as possible. Areas of potential importance include biodegradable filter materials, biodegradable/recyclable packaging and the utilization of recycled materials in our packaging. Analytical tools for the identification of packaging components should be reviewed and updated as necessary.

WASTE AND EMISSIONS MANAGEMENT TECHNOLOGIES

Technologies associated with reducing the production, or disposing of liquid, solid or gaseous waste materials.

Status:

Increasing environmental concerns are resulting in a proliferation of rulings from government agencies. These span the range from specific compound emissions through storage requirements and the disposal of solid and liquid waste streams. Landfills are rapidly being eliminated, waste water and volatile emissions are under increasing scrutiny.

Likely Scenario:

These concerns are expected to increase. Government controls on organic, toxic and "irritant" emissions will increase. Landfills and hazardous waste landfills will close, while controls on hazardous waste transport and disposal will increase. Restrictions on waste water will be increased; additional standards may be set for particular elements or compounds.

R&D Response:

The PM USA Environmental Health and Safety Plan for 1991-95 addresses numerous issues specific to PM and defines strategies and action plans for each. While many phases of this plan may require R&D involvement, the following are set forth explicitly:

Research on the degradation of identified emissions.

Implementation of further tobacco treatment with Kabat.

Continued research on processes to reduce current volatile emissions.

Evaluate laboratory procedures to find ways of minimizing hazardous waste generation.

Evaluate methods to remove sand from tobacco prior to processing.

Develop and implement a pre-treatment system to dispose of process waste at Bermuda Hundred.

Identify unregulated materials for which internal standards should be developed.

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Update annually the "acceptable pesticides" list.

Implement written programs for pesticide management.

Establish tobacco conditioning cycles for obtaining Phyto certificates.

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CHEMICAL SENSES

This area can be operationally defined as "the development of a fundamental understanding of those physical/chemical and biological system interactions that result in subjective response to a product." The senses of primary interest include taste, odor, feel (e.g. trigeminal), vision and the role of cognitive factors (e.g. consumer expectancy). The levels of interest encompass single compounds, mixtures, receptors, biochemistry, physiology, cognition evaluation, study designs, testing and hypothesis evaluations.

Status:

Technological and marketing factors have prompted increased activity in the chemical senses areas by consumer goods manufacturers. Activities noted in the literature range from fundamental mechanism and physiology studies through the development of new consumer testing tools.

Likely Scenario:

We believe that fundamental understanding in this area will increase rapidly during the plan period, augmented by the increasing power of computers to identify chemical configurations and model complex systems. Consumer applications will follow quickly. Philip Morris' competitors are known to be active in this area.

Alternate Scenarios:

A breakthrough in fundamental understanding could lead quickly to the development of unique new products - perhaps by our competitors.

The identification of specific chemical species which are critical to subjective response could result in selective filters for those species.

R&D Response:

Proposed responses are discussed elsewhere in this plan (sec. ???.) Briefly, our initial response must be to clearly define our objectives in this area in order to design studies or acquire tools which will lead to the timely development of product improvements.

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* Emerging Technologies - A Survey of Technical and Economic Opportunities, Technology Administration, U.S. Department of Commerce, Spring 1990.

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Appendix E

APPENDIX E

Strategic Technologies

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STRATEGIC SCIENCE AND TECHNOLOGY ITEMS

Table 1: Listed by Major R&D Program

Table 2: Listed by Science or Technology - For items which support two or more programs.

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TABLE I
STRATEGIC SCIENCE AND TECHNOLOGY ITEMS
LISTED BY MAJOR R&D PROGRAM

key: A=well developed externally
B=emerging/developing externally
C=no known external development

AMBROSIA

| | |
|---|---|
| <u>Paper Coating</u> technologies | A |
| <u>Chemical Senses</u> - Means to mask or synergistically cancel aroma or taste. | B |
| <u>Encapsulation Technology</u> | B |
| <u>Paper-Additive Interactions</u> - Means to predict the stability of aroma compounds on paper | C |
| <u>Combustion Physics & Chemistry</u> - Decomposition routes & products | C |
| <u>Basic Research Support</u> | |
| Consumer Testing | |
| Flavors | |

ART

| | |
|---|---|
| <u>Selective Separation</u> technologies | B |
| <u>Simulation & Modeling</u> of ART processes | B |
| <u>Chemical Senses</u> - Means to simulate the "impact" of nicotine. | C |
| <u>Nicotine Disposal</u> technologies | B |
| <u>Thermodynamics and Kinetics</u> of nicotine-tobacco system | C |
| <u>Continuous Feed Technologies</u> - in/out of high pressure systems | C |
| <u>Basic Research Support</u> | |
| Biological | |
| Computing | |
| Consumer Testing | |
| Flavors | |
| Separations | |

CAST SHEET

| | |
|---|---|
| <u>Casting and Drying</u> technologies | A |
| <u>Release Compounds/Technologies</u> | B |
| <u>Binder Formulation</u> | C |
| <u>"Microbubble" Technology</u> - for modifying sheet character | C |
| <u>Extrusion Technologies</u> - for cast sheet | C |
| <u>Basic Research Support</u> | |
| Biological | |
| Combustion Physics & Chemistry | |
| Flavors | |

2026230355

key: A=well developed externally
 B=emerging/developing externally
 C=no known external development

DOMESTIC PRODUCT SUPPORT

This program area implements developed technologies which result from the other program areas.

EXPANDED PRODUCT

| | |
|---|---|
| <u>Simulation & Modeling</u> - of two phase flow | A |
| <u>Machine Design</u> - maker for low density products | B |
| <u>Thermodynamics and Kinetics</u> | |
| - of CO ₂ / tobacco interactions | C |
| - of tobacco thermal treatment | C |
| - of Kabat loss during processing | C |
| <u>Continuous Feed Technologies</u> - in/out of pressurized systems | C |
| <u>Binder Technology</u> | C |

Basic Research Support

Combustion Physics & Chemistry
Computing
Flavors

FILTER R&D

| | |
|--|---|
| <u>Filter Fabrication</u> - in-house facility/expertise | A |
| <u>Chemical Senses</u> - identity of important flavor components | B |
| <u>Combustion Physics & Chemistry</u> - flavor component generation | C |

Basic Research Support

Aerosols
Catalysis
Computing
Consumer Testing
Flavors
Selective Filtration

INTERNATIONAL PRODUCTS

| | |
|--|---|
| <u>Combustion Physics & Chemistry</u> - methods for improving the smoking characteristics of stems | C |
|--|---|

This program area primarily implements developed technologies which result from the other program areas.

A need to support existing (older) technologies in in South American factories was expressed, but this may not be an R&D program need.

key: A=well developed externally
 B=emerging/developing externally
 C=no known external development

LBA:

| | |
|--|---|
| <u>Tumor Promotion Assays</u> - Short-term in vitro | B |
| <u>Cellular Detoxification and Toxification</u> | B |
| <u>Macromolecular Adduct Assays</u> - DNA & protein | B |
| <u>Oncogene Assays</u> | B |
| <u>Genetic Susceptibility Markers</u> (RG genes, etc.) | B |
| - role of cellular messengers other | B |
| biologically reactive species | |
| <u>Biochemistry</u> - role of NO _x in cellular reactivity | C |
| <u>Basic Research Support</u> | |

Biological
 Combustion Physics & Chemistry
 Separations

LOW TAR HIGH TASTE and
REDUCED TAR AND NICOTINE

| | |
|---|---|
| <u>Chemical Senses</u> | B |
| <u>Smoke Chemistry</u> - Flavor generation mechanisms | C |
| <u>Filtration Mechanisms</u> - Means for selective separation of vapor phase components | C |
| <u>Simulation & Modeling</u> - to predict delivery of critical flavor components from cigarette parameters | C |
| <u>Flavor Release Technologies</u> - for releasing flavors from filters | B |

Basic Research Support

Aerosols
 Biological
 Combustion Physics & Chemistry
 Consumer Testing
 Flavors
 Separations

key: A=well developed externally
 B=emerging/developing externally
 C=no known external development

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OPERATIONS SUPPORT

| | |
|--|---|
| <u>Polymer Characterization Technology</u> - Methodology for characterizing high molecular weight materials. | A |
| <u>Environmental Sample Processing</u> - methods, facility and in-house expertise | A |
| <u>Statistical Analysis/Experimental Design</u> - resident in the Analytical Research Division | A |
| <u>"Forensic Chemistry"</u> - expertise in determining probable causes of product problems | A |
| <u>Chemical Senses</u> - for relating analytical and subjective results | B |
| <u>Analytical Databases</u> | B |

Basic Research Support

- Computing
- Entomology
- Measurement and Sensing
- Microbiology

OPTICAL PROCESSING

| | |
|---|---|
| <u>Algorithm Concepts & Development</u> | B |
| <u>High Speed Processing</u> (computing) technologies | B |
| <u>High Speed Scanning</u> (camera) technologies | B |
| <u>High Speed Presentation</u> technology & hardware | C |

Basic Research Support

- Computing
- Measurement and Sensing

PAPER/SIDESTREAM

| | |
|---|---|
| <u>Particle Morphology Measurement/Classification</u> | B |
| <u>Analysis Techniques</u> - Real time analysis of sidestream smoke | B |
| <u>Catalysis</u> for conversion of gas phase components | B |
| <u>Selective Filtration</u> - objectional taste/aroma elements | C |
| <u>Chemical Senses</u> - subjective-analytical correlations | B |
| <u>Filler-Fiber Interactions</u> in papers | C |

Basic Research Support

- Aerosols
- Combustion Physics & Chemistry
- Consumer Testing
- Flavors
- Measurement and Sensing

2026230358

key: A=well developed externally
 B=emerging/developing externally
 C=no known external development

PACT

| | |
|--|---|
| <u>Catalysts</u> for CO removal from ambient air | B |
| <u>Analysis Techniques</u> - to measure extremely low concentrations of organic vapors | A |

Basic Research Support

Aerosols
Catalysis
Consumer Testing
Measurement and Sensing

TOMORROW

| | | |
|---|--|---|
| <u>Machine Design</u> | - maker for low density products | B |
| <u>Catalysis</u> | - CO reduction in low porosity product | B |
| <u>Simulation & Modeling</u> | - fabric ignition | B |
| | - heat generation & transmission | B |
| <u>Combustion Physics & Chemistry</u> | - reduced combustion | |
| | energy | B |
| | - heat absorbing compounds | B |
| | - insulating wrappers/ fillers | B |
| <u>On-Line Porosity Measurement</u> | technology | C |
| <u>Expanded Tobacco</u> | technology | C |

Basic Research Support

Catalysis
Combustion Physics & Chemistry
Computing
Consumer Testing
Measurement and Sensing

2026230359

TSNA

Biological
Combustion Physics & Chemistry
Separations.

2026230360

TABLE II
AREAS OF SCIENCE OR TECHNOLOGY IMPORTANT TO TWO OR MORE R&D MAJOR PROGRAMS

key: A=well developed externally
 B=emerging/developing externally
 C=no known external development

ANALYSIS TECHNIQUES

| | |
|--|---|
| <u>Paper/Sidestream</u> - Real time analysis of sidestream smoke | B |
| <u>PACT</u> - Analysis of extremely low concentrations of organic vapors | A |

BINDER TECHNOLOGY

| | |
|---|---|
| <u>Cast Sheet</u> - Binder formulation | C |
| <u>Expanded Product</u> - Low density product | C |

CATALYSTS

| | |
|--|---|
| <u>Paper/Sidestream</u> - Gas phase conversion | B |
| <u>PACT</u> - CO removal from ambient air | B |
| <u>Tomorrow</u> - CO reduction in low porosity product | B |
| <u>TSNA</u> - Decomposition of TSNA's | C |

CHEMICAL SENSES

| | |
|---|---|
| <u>Ambrosia</u> - Means to mask or synergistically cancel aroma or taste | B |
| <u>Filter R&D</u> - Identify important flavor components | B |
| <u>Low Tar High Taste</u> - Important flavor components | B |
| <u>Operations Support</u> - Relationship of analytical and subjective results | B |
| <u>Paper/Sidestream</u> - Relationship of analytical and subjective results | B |
| <u>ART</u> - Simulation of nicotine impact | C |

COMBUSTION PHYSICS & CHEMISTRY

| | |
|---|---|
| <u>Ambrosia</u> - Generation of taste/odor components | C |
| <u>Filter R&D</u> - Flavor component generation | C |
| <u>International Products</u> - Improved taste from stems | C |
| <u>Low Tar High Taste</u> - Flavor generation mechanisms | C |
| <u>Tomorrow</u> - Reduced combustion energy | B |
| - Heat absorbing compounds | B |
| - Insulating wrappers/fillers | B |
| <u>TSNA</u> - Pyrosynthetic pathways | C |

2026230361

key: A=well developed externally
 B=emerging/developing externally
 C=no known external development

CONTINUOUS FEED TECHNOLOGIES

ART & - Tobacco movement in and out C
EXPANDED PRODUCT of pressurized systems

MACHINE DESIGN

EXPANDED PRODUCT & - Maker for low density products B
TOMORROW

SELECTIVE SEPARATIONS

ART - Selective extractions B
TSNA - Solvent/co-solvent effects B
 - Solubility modification B

SIMULATION AND MODELING

Expanded Product - Modeling of two phase flow A
ART - Simulation of extraction process B
Tomorrow - Models of - Fabric ignition B
 - Heat generation & transmission B
Low Tar High Taste - Predict delivery of flavor components C

THERMODYNAMICS & KINETICS OF CHEMICAL SYSTEMS

ART - Nicotine-tobacco system C
Expanded Product - CO-tobacco system C
 - Thermal treatment of tobacco C

2026230362

Appendix F

2026230363

APPENDIX F

PM USA R&D Patents and Publications

2026230364

PHILIP MORRIS PATENTS

July, 1989 - July, 1990

2026230365

I. FILTER TECHNOLOGY

2026230366

United States Patent [19]

Patron et al.

[11] Patent Number: 4,848,375

[45] Date of Patent: Jul. 18, 1989

[54] FILTER CIGARETTE

[75] Inventors: Gregorio L. Patron, Midlothian;
Walter A. Nichols; Paul N. Gauvin,
both of Richmond; Francis M.
Sprinkel, Jr., Glen Allen, all of Va.

[73] Assignee: Philip Morris Incorporated, New
York, N.Y.

[21] Appl. No.: 119,047

[22] Filed: Nov. 10, 1987

[51] Int. Cl.⁴ A24D 3/04; A24D 3/06

[52] U.S. Cl. 131/335; 131/336;
131/198.2

[58] Field of Search 131/335, 336, 198.1,
131/198.2

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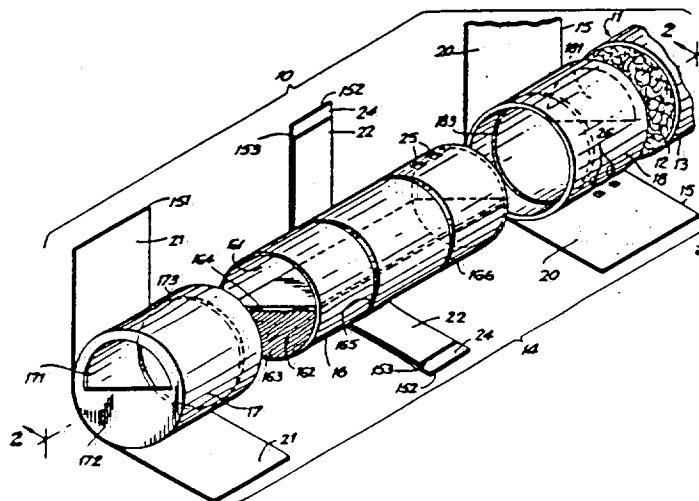
Primary Examiner—Vincent Millin

Attorney, Agent, or Firm—Jeffrey H. Ingberman

[57] ABSTRACT

A filter cigarette is provided in which the smoker can select different flavorants or filter media for interposition in the smoke stream. A filter segment having two flow paths, each containing different flavoring or filtering media, cooperates with one or two rotatable end caps having openings for selective registration with the flow paths, are used to select the desired flow path. A method of delivering "air-swept flavor" is also provided.

34 Claims, 4 Drawing Sheets



2026230367

United States Patent [19]
Sprinkel Jr.

[11] Patent Number: 4,869,276
[45] Date of Patent: Sep. 26, 1989

- [54] HINGED FILTER SLEEVE
[75] Inventor: Francis M. Sprinkel Jr., Glen Allen, Va.
[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 89,445
[22] Filed: Aug. 26, 1987

- [51] Int. Cl.⁴ A24D 3/04
[52] U.S. Cl. 131/361; 131/336
[58] Field of Search 131/336, 342, 365, 361, 131/362

[56] References Cited

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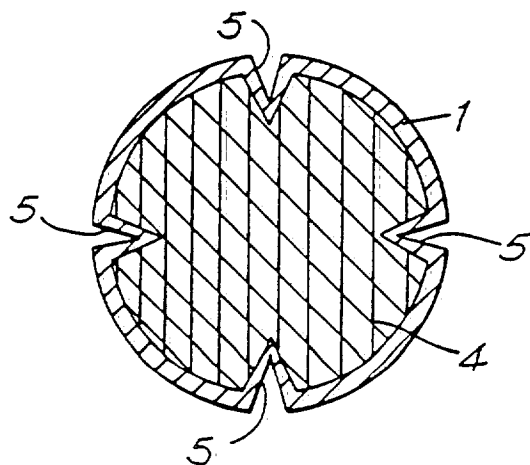
- 1027901 5/1953 France .
1110914 4/1968 United Kingdom .

Primary Examiner—V. Millin
Attorney, Agent, or Firm—Eric M. Lee

[57] ABSTRACT

A filter cigarette is provided with a filter assembly having a substantially tubular sleeve with at least one hinge formed in the periphery of the substantially tubular sleeve. The hinge causes the sleeve to be resilient in the radial direction which allows the sleeve diameter to decrease and increase so that the radii of the tobacco rod and filter assembly can be properly matched and the tipping material can be tightly wrapped around the filter assembly.

6 Claims, 1 Drawing Sheet



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PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT.—PATENT SECTION

DEC 11 1989

- [54] METHOD FOR IMPROVING THE CRIMPING OF POLYOLEFIN FILTER TOW
- [75] Inventors: Michael Hill, Ascot, England;
Walter A. Nichols, Richmond, Va.
- [73] Assignee: Filter Materials Limited, New York, N.Y.
- [21] Appl. No.: 231,148
- [22] Filed: Aug. 10, 1988
- [51] Int. CL⁵: D01D 5/22; D01D 5/42
- [52] U.S. CL: 264/25; 264/26; 264/147; 264/168; 264/563; 264/DIG. 47
- [58] Field of Search: 264/DIG. 47, 563, 25, 264/26, 147, 168; 28/257

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- 3,577,724 5/1971 Greene 57/157
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- 1260957 1/1972 United Kingdom
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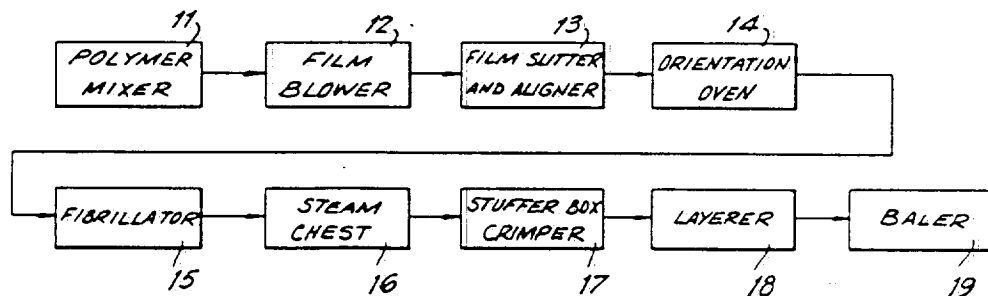
Primary Examiner—James Lowe

Attorney, Agent, or Firm—Jeffrey H. Ingerman

[57] ABSTRACT

A method is provided for heating fibrillated polyolefin film prior to crimping, to improve the crimping, and thus the yield and variability as a filter, of the tow. The fibrillated tow is crimped while still hot from the heating step. The resulting fibers have more uniform crimping at higher levels than those not subject to heating.

19 Claims, 2 Drawing Sheets



II. FLAVOR TECHNOLOGY

2026230370

United States Patent [19]

Williams et al.

[11] Patent Number: 4,859,775

[45] Date of Patent: Aug. 22, 1989

[54] PROCESS FOR PREPARING ACYLPYRAZINE ETHERS

[75] Inventors: David L. Williams; Everett W. Southwick; Yoram Houminer, all of Richmond, Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 27,547

[22] Filed: Mar. 18, 1987

Related U.S. Application Data

[62] Division of Ser. No. 782,545, Oct. 1, 1985, Pat. No. 4,728,738.

[51] Int. CL⁴ C07D 241/16; C07D 241/18;
C07D 405/12

[52] U.S. CL. 544/405; 131/278;
544/406

[58] Field of Search 544/405, 406; 131/278

[56] References Cited

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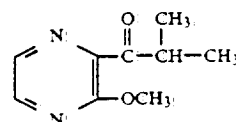
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Williams et al., Chem. Abst., vol. 103 (1985), 157636e.

Primary Examiner—Cecilia Shen

[57] ABSTRACT

In one of its embodiments the present invention provides a smoking composition which contains a novel type of acylpyrazine ether flavorant additive as exemplified by 1-(3-methoxy-2-pyrazinyl)-2-methyl-1-propanone.



6 Claims, No Drawings

2026230371

United States Patent [19]

Howe et al.

[11] Patent Number: 4,872,917

[45] Date of Patent: Oct. 10, 1989

[54] SCLARAL ALKYL ETHERS AND SMOKING COMPOSITIONS CONTAINING A SCLARAL ALKYL ETHER FLAVORANT

[75] Inventors: Charles R. Howe; Everett W. Southwick, both of Richmond; Richard H. Cox, Midlothian, all of Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 818,452

[22] Filed: Jan. 13, 1986

[51] Int. Cl.⁴ A74B 3/12

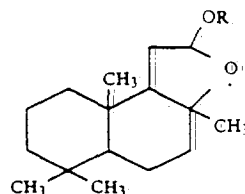
[52] U.S. Cl. 131/275; 131/276; 131/277

[58] Field of Search 131/275, 276, 277, 278

Primary Examiner—V. Millin

[57] ABSTRACT

This invention provides novel sclaral alkyl ether compounds, and smoking compositions which contain a sclaral alkyl ether compound as a flavorant additive.



Under cigarette smoking conditions the sclaral ether is a volatile component which enhances the flavor of the mainstream smoke and the aroma of sidestream smoke.

13 Claims, No Drawings

2026230372

United States Patent [19]

Podraza et al.

[11] Patent Number: 4,872,918

[45] Date of Patent: Oct. 10, 1989

[54] HETEROCYCLIC ESTERS AND SMOKING COMPOSITIONS CONTAINING A HETEROCYCLIC ESTER FLAVORANT-RELEASE ADDITIVE

[75] Inventors: Kenneth F. Podraza; Yoram Houminer, both of Richmond, Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 861,945

[22] Filed: May 12, 1986

[51] Int. Cl.⁴ A24B 3/12; A24B 15/36

[52] U.S. CL 131/277; 131/278; 131/279

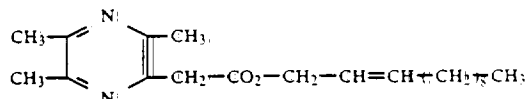
[58] Field of Search 131/277, 278, 279

Primary Examiner—V. Millin

[57] ABSTRACT

This invention provides novel heterocyclic ester com-

pounds. This invention further provides smoking compositions which contain an invention heterocyclic ester as a flavorant-release additive, as illustrated by the following structure:



Under normal cigarette smoking conditions, tetramethylpyrazine and an olefin are released as pyrolysis products, and they enhance the flavor and aroma of the mainstream and sidestream smoke.

24 Claims, No Drawings

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DEC 18 1989

NOTED: _____

2026230373

United States Patent [19]

Williams et al.

[11] Patent Number: 4,925,985

[45] Date of Patent: May 15, 1990

[54] PROCESS FOR THE PRODUCTION OF
4,6-DIMETHYL-7-HYDROXYNONAN-3-ONE

[75] Inventors: David L. Williams; William B. Edwards, III, both of Richmond; Richard H. Cox; Daryl L. Faustini, both of Midlothian; Surnease Drew, Richmond, all of Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 266,162

[22] Filed: Nov. 2, 1988

[51] Int. CL³ C07C 45/67

[52] U.S. CL. 568/384; 568/386; 568/392; 568/404; 560/266; 558/435; 558/440; 549/356

[58] Field of Search 568/386, 384, 392, 404; 560/266; 558/435, 440; 549/356

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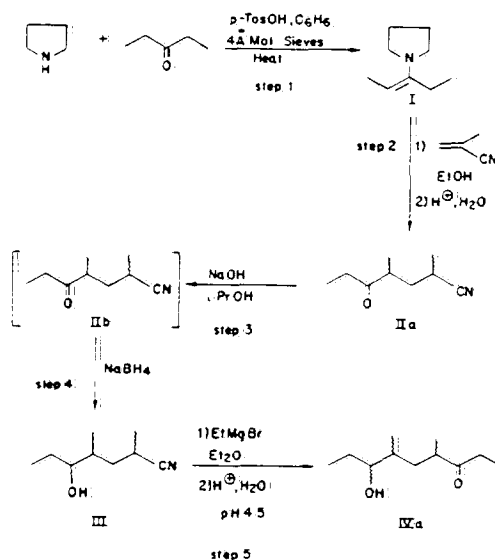
Chuman et al., J. Chem., Ecology, vol. 11, #4 (1985).

Primary Examiner—James H. Reamer

[57] ABSTRACT

A process for the production of 4,6-dimethyl-7-hydroxynonan-3-one of specific stereochemistry is disclosed. The process results in an active (+)-serricornin.

4 Claims, 7 Drawing Sheets



2026230374

United States Patent [19]

Roncero

[11] Patent Number: 4,843,801

[45] Date of Patent: Jul. 4, 1989

[54] METHODS AND APPARATUS FOR OPENING CLOSED CONTAINERS

[75] Inventor: Jose I. Roncero, Richmond, Va.

[73] Assignee: Philip Morris Incorporated, New
York, N.Y.

[21] Appl. No.: 198,497

[22] Filed: May 25, 1988

[51] Int. Cl.⁴ B65B 43/26

[52] U.S. Cl. 53/492; 53/381 R;
414/411

[58] Field of Search 53/381 R, 492; 414/411,
414/412, 414

[56] References Cited

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Primary Examiner—John Sipos

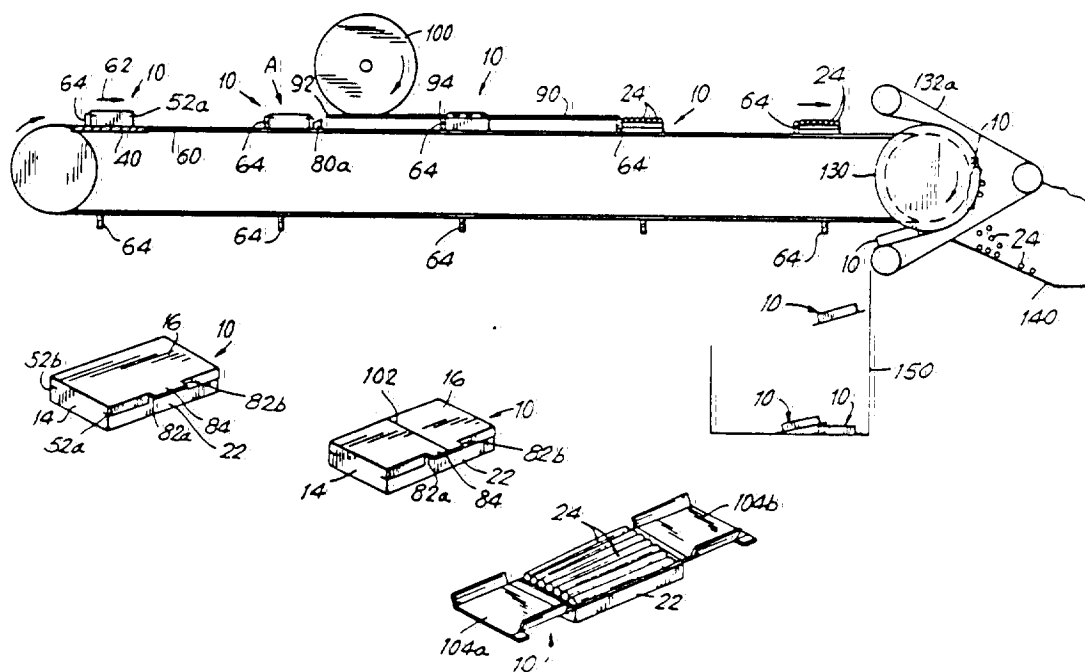
Assistant Examiner—Ann Tran

Attorney, Agent, or Firm—Robert R. Jackson

[57] ABSTRACT

Methods and apparatus for opening containers such as cigarette packages without damaging the contents of the containers. If desired, the methods and apparatus may be extended to include emptying the containers after they have been opened.

23 Claims, 10 Drawing Sheets



2026230375

III. PACKAGING TECHNOLOGY

2026230376

United States Patent [19]
Campbell

[11] **Patent Number:** 4,850,482
[45] **Date of Patent:** Jul. 25, 1989

- [54] **CIGARETTE BOX INNERFRAME**
[75] **Inventor:** Christopher J. Campbell, Midlothian, Va.
[73] **Assignee:** Philip Morris Incorporated, New York, N.Y.

[21] **Appl. No.:** 205,317
[22] **Filed:** Jun. 10, 1988

- [51] **Int. Cl.⁴** B65D 85/10; B65D 5/48
[52] **U.S. Cl.** 206/273; 206/271;
206/268; 229/160.1
[58] **Field of Search** 206/268, 271, 273;
229/146, 160.1

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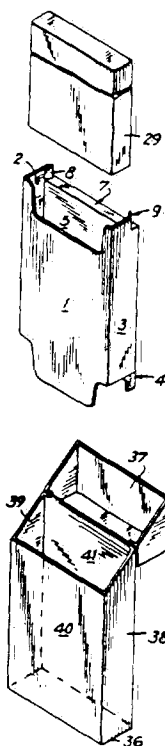
"Packaging of Cigarettes", Disclosure 88/5. *Tobacco Patents Information Bulletin*, vol. 88, No. 35-36, Sep. 2, 1988.

Primary Examiner—John Rivell
Attorney, Agent, or Firm—Doreen F. Shulman

[57] **ABSTRACT**

A paperboard innerframe for insertion into a cigarette box is provided. The innerframe allows a bundle of smaller than standard size cigarettes or a bundle of a small number of standard size cigarettes to be retained securely in a cigarette box that is larger than necessary to hold a bundle of such cigarettes exactly. The innerframe has a front panel, outer side panels, inner side panels, a back panel, a concealing flap and tapering tabs.

29 Claims, 3 Drawing Sheets



2026230377

[54] HINGED TOP CIGARETTE BOX

[75] Inventors: Donald H. Evers; Xuan M. Phan,
both of Richmond, Va.[73] Assignee: Philip Morris Incorporated, New
York, N.Y.

[21] Appl. No.: 387,835

[22] Filed: Aug. 1, 1989

[51] Int. Cl.: A24F 15/00

[52] U.S. Cl.: 206/265; 206/270;
206/261; 206/204; 229/125.08; 229/125.17[58] Field of Search: 206/261, 265, 268, 270;
206/271, 273, 204; 229/125.01, 125.08; 125.17

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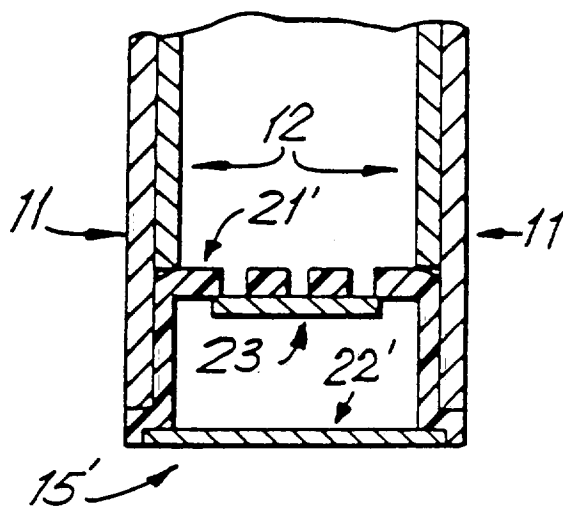
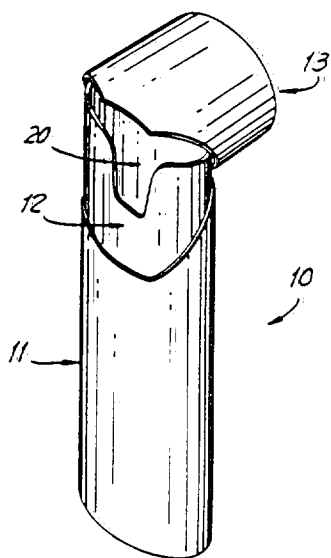
Primary Examiner—David T. Fidei

Attorney, Agent, or Firm—Eric M. Lee

[57] ABSTRACT

A hinged top cigarette box is provided. The box has an inner sleeve nested inside an outer sleeve. Preferably both the inner sleeve member and the outer sleeve member are formed from the same laminate blank. The outer sleeve member has a cover member formed therein. The cover member opens and closes by the use of a flexural hinge. Alternatively, the hinged top box can be formed by separate laminate blanks. Plugs may be used to close the top and bottom portion of the hinged top box to hold the shape of the hinged top box and to prevent cigarettes or loose tobacco from falling therethrough.

13 Claims, 6 Drawing Sheets



2026230378

United States Patent [19]
Marlow et al.

[11] **Patent Number:** Des. 303,722
[45] **Date of Patent:** ** Sep. 26, 1989

[54] **PACK FOR CIGARETTES**

[75] **Inventors:** Nicholas S. Marlow, London,
England; Witold Gruenbaum,
Chez-le-Bart, Switzerland

[73] **Assignee:** Fabriques de Tabac Reunies, S.A.,
Neuchatel, Switzerland

[**] **Term:** 14 Years

[21] **Appl. No.:** 915,038

[22] **Filed:** Oct. 3, 1986

[30] **Foreign Application Priority Data**

Apr. 4, 1986 [GB] United Kingdom 1033223
[52] **U.S. Cl.** D27/189
[58] **Field of Search** D27/100-101,
D27/187, 189; D9/423; 229/160.1; 206/268,
273

[56] **References Cited**

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#938510, Philip Morris Incorporated, 7-1972.

Primary Examiner—Susan J. Lucas

Assistant Examiner—Joel Sincavage

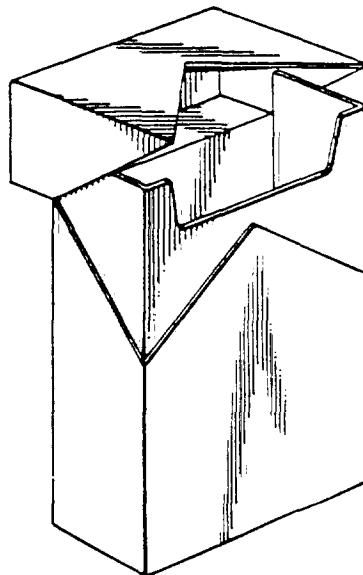
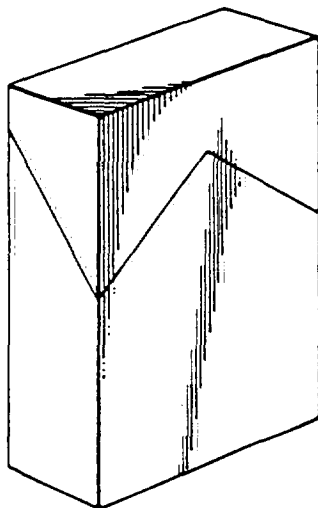
Attorney, Agent, or Firm—Jeffrey H. Ingeman

[57] **CLAIM**

The ornamental design for a pack for cigarettes, as
shown and described.

DESCRIPTION

FIG. 1 is a front perspective view of a pack for cigarettes in the closed position showing our new design;
FIG. 2 is a front perspective view thereof in the open position;
FIG. 3 is a rear elevational view thereof; and
FIG. 4 is a right side elevational view thereof.



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2026230379

[54] APPARATUS AND METHOD FOR MEASURING TWO PROPERTIES OF AN OBJECT USING SCATTERED ELECTROMAGNETIC RADIATION

[75] Inventor: David A. Lowitz, Richmond, Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 342,872

[22] Filed: Apr. 25, 1989

[51] Int. Cl.⁵ G01R 27/04

[52] U.S. Cl. 324/631; 324/638; 324/632; 324/643; 324/634; 131/905

[58] Field of Search 131/905, 906, 908; 324/631, 638, 632, 643, 634

[56] References Cited

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Primary Examiner—Reinhard J. Eisenzopf

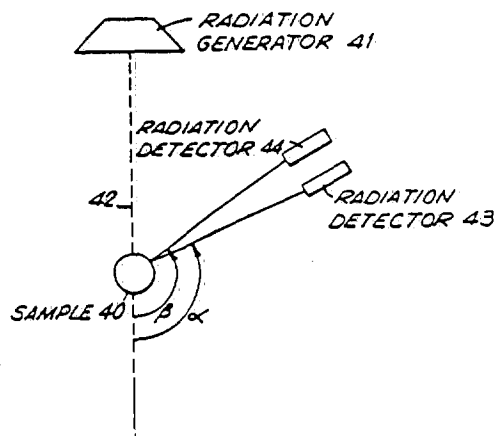
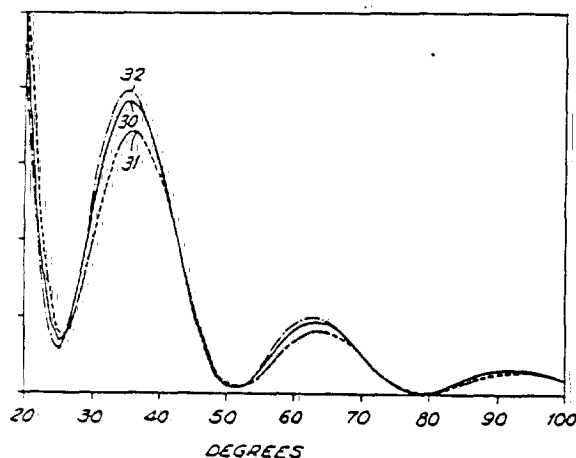
Assistant Examiner—Jose M. Solis

Attorney, Agent, or Firm—Jeffrey H. Ingberman

[57] ABSTRACT

A method and apparatus for monitoring two components of an object, such as moisture content and density in a tobacco rod, using scattered electromagnetic radiation are provided. The invention relies on the fact that both the real imaginary parts of the dielectric constant of water vary greatly over frequencies in the gigahertz region while those of the remaining constituents of tobacco do not, and particularly on the fact that, at frequencies approaching 100 GHz, the real part of the dielectric constant of water is much closer to that of many organic polymers, such as those making up tobacco, than it is at lower frequencies, and the imaginary part of the dielectric constant of water is much lower at frequencies approaching 100 GHz than it is in the region of 20 to 30 GHz. By comparing the scattering of electromagnetic radiation by the object—i.e., the cigarette rod—at two different frequencies and using a predetermined calibration curve based on a cigarette rod having a desired moisture content and density, one can determine the moisture content and density of the cigarette rod. If the monitoring is taking place on a cigarette making machine and the moisture content and density deviate from their desired values, the machine feeds can be adjusted automatically to restore the desired moisture content and density.

35 Claims, 6 Drawing Sheets



2026230380

IV. MAKE/PACK TECHNOLOGY

2026230381

[54] AIRLOCK HAVING FLAPS IN CONTINUOUS FEED OF MATERIAL CARRIED BY A GAS STREAM WHILE OBSTRUCTING FREE FLOW OF GAS

[75] Inventor: William R. Sweeney, Richmond, Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 135,145

[22] Filed: Dec. 18, 1987

[51] Int. Cl.⁴ B65G 53/08

[52] U.S. Cl. 406/62; 131/84.3; 131/109.1; 198/604; 198/607; 198/690.2; 414/217; 406/78

[58] Field of Search 406/62, 63, 64, 67, 406/72, 74, 80, 81, 82, 51, 52, 65, 68, 77, 79; 131/109.1, 84.3, 287; 414/217, 221; 198/607, 604, 626, 698, 690.2, 689.1, 428, 438, 494

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| US79/00705 | 9/1979 | PCT Int'l Appl. |
| 206350 | 11/1923 | United Kingdom |

Primary Examiner—Joseph F. Peters, Jr.

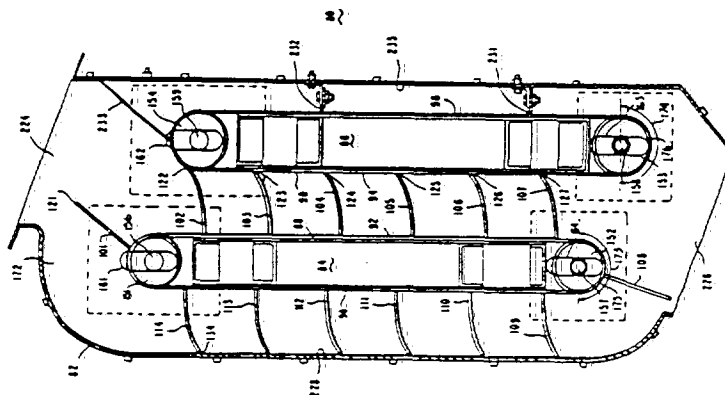
Assistant Examiner—Gregory R. Poindexter

Attorney, Agent, or Firm—Jeffrey H. Ingerman

[57] ABSTRACT

An airlock for the continuously feeding through of a material while obstructing the free flow of a gas is provided. The airlock comprises a first continuous belt having a plurality of nonporous flaps projecting out from it. Each flap has a free edge located outwardly from the belt. A second belt runs parallel to the first and has elements to seal against the free edges of the flaps of the first belt. A motor moves the belts so that their transport sides move together. Particulates are transported in the chambers formed by belts and flaps while the flow of air between and past the belts is inhibited.

10 Claims, 6 Drawing Sheets



2026230382

[54] SEPARATION OF LIGHT PARTICLES FROM
HEAVY PARTICLES IN A STREAM OF
PARTICULATE MATTER

[75] Inventor: Jack C. Wheless, Richmond, Va.

[73] Assignee: Philip Morris Incorporated, New
York, N.Y.

[21] Appl. No.: 85,868

[22] Filed: Aug. 14, 1987

[51] Int. CL⁴ A24C 5/39

[52] U.S. CL 131/110; 131/84.3

[58] Field of Search 131/84.3, 110, 109.1,
131/169.2

[56] References Cited

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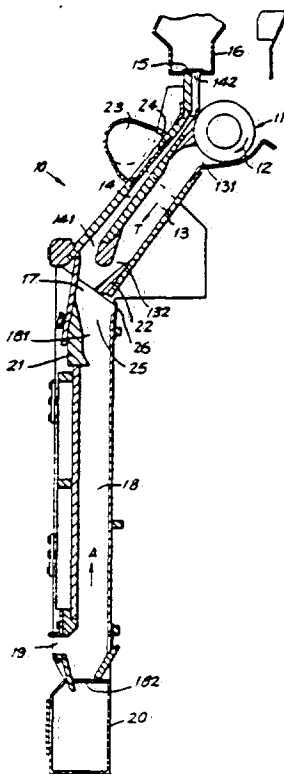
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Jeffrey H. Ingerman

[57] ABSTRACT

A method and apparatus for separating light particles from heavy particles in a stream of particulate matter, particularly for separating stems from the stream of tobacco filler fed to a cigarette maker, is provided. The tobacco is introduced into a first chamber in which it travels generally downward to a fourth chamber communicating with second and third chambers, the second chamber being the chimney of the cigarette maker and the third chamber extending downward from the fourth chamber. An air stream flowing upward through the third chamber reverses the momentum of most of the light particles and propels them into the chimney, while the heavy particles (stems) and some light particles travel downward into the third chamber. As the light particles fall through the third chamber, their momentum is gradually reversed by the air stream and they rise through the fourth chamber into the chimney. The heavy particles are collected at the bottom of the third chamber.

7 Claims, 1 Drawing Sheet

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2026230383

[54] APPARATUS AND METHOD FOR IN-PLACE CLEANING AND PRIMING OF A NOZZLE ASSEMBLY

2030894 4/1980 United Kingdom
2163528 2/1986 United Kingdom

[75] Inventors: Bernard A. Semp; Bernard C. Kiernan; David L. Bilunas; Michael L. Watkins, all of Richmond, Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 286,354

[22] Filed: Dec. 19, 1988

[51] Int. CL⁴ B08B 3/08; B08B 5/04

[52] U.S. CL 134/21; 134/22.18;
134/22.19; 134/22.12; 134/22.14; 134/57 R;
134/169 R

[58] Field of Search 134/21, 22.18, 22.19,
134/104.1, 198, 169 R, 22.12, 22.14

[56] References Cited

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Primary Examiner—Asok Pal

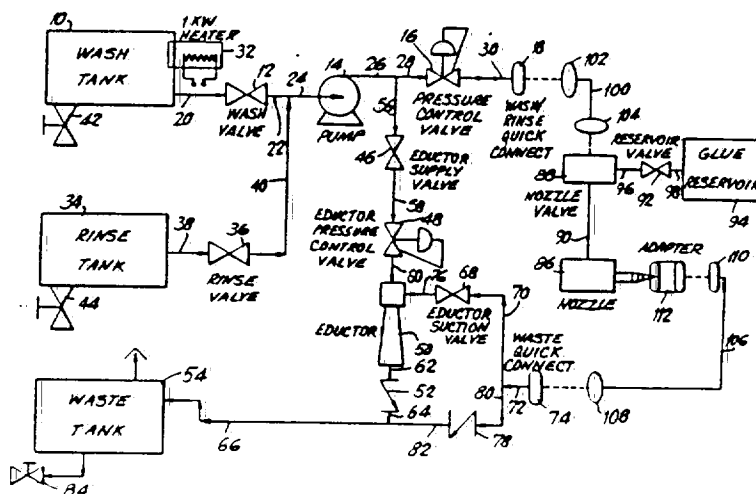
Assistant Examiner—Ourmazd Ojan

Attorney, Agent, or Firm—Charles B. Smith; Alan D. Smith

[57] ABSTRACT

An apparatus and method for in-place cleaning and priming of an in-place nozzle assembly which in normal operation receives from a reservoir and discharges to a work area a fluid material which tends to leave behind an accumulation of undesired residue. The apparatus includes control means for sequentially actuating for a selected cleaning time period first selectively actuatable means thereby to deliver an effective quantity of the cleaning substance to the nozzle and for actuating for a selected rinsing time period second selectively actuatable means thereby to deliver an effective quantity of the rinsing substance to the nozzle. The apparatus also includes third selectively actuatable means for drawing fluid material from the reservoir and delivering the same to the nozzle for a selected priming time period first to flush out any remaining rinsing substance from the nozzle and then to leave the nozzle primed with the fluid material.

2 Claims, 1 Drawing Sheet



[54] APPARATUS AND METHOD FOR
CARRYING OUT MEASUREMENTS ON A
BOBBIN OF SHEET MATERIAL

[75] Inventors: William H. Stevens, Richmond;
Everett C. Grollmund, Midlothian,
both of Va.

[73] Assignee: Philip Morris Incorporated, New
York, N.Y.

[21] Appl. No.: 308,731

[22] Filed: Feb. 9, 1989

[51] Int. Cl.⁴ G01N 15/08

[52] U.S. Cl. 73/866; 73/38

[58] Field of Search 73/866, 38, 865.8, 159,
73/866; 250/562, 572

[56] References Cited

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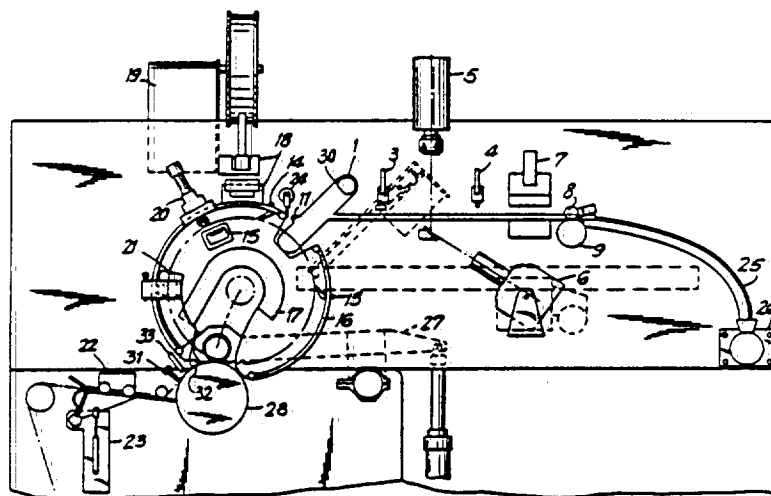
7177 1/1986 Japan 250/562

Primary Examiner—Jerry W. Myracle

[57] ABSTRACT

An apparatus and method for automatically stripping sheet material from a bobbin, measuring characteristics of the material and labelling the bobbin. The apparatus includes a delaminator pick-up device for securing a lamination layer of the material and picking-up the secured portion from the bobbin. A threading device threads the secured portion and contiguous portions of the material through a measurement device. The threaded material is engaged by an engaging device and passed through the measurement device. The measurement device measures characteristics of the material.

23 Claims, 6 Drawing Sheets



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United States Patent [19]

Grollimund et al.

[11] Patent Number: 4,911,374

[45] Date of Patent: Mar. 27, 1990

[54] SYSTEM AND METHOD FOR USE IN
DELAMINATING BOBBINS OF PAPER
MATERIAL

[75] Inventors: Everett C. Grollimund, Midlothian;
Donald L. Brookman; Steven F.
Spiers, both of Richmond, all of Va.

[73] Assignee: Philip Morris Incorporated, New
York, N.Y.

[21] Appl. No.: 306,998

[22] Filed: Feb. 6, 1989

Related U.S. Application Data

[62] Division of Ser. No. 820,665, Jan. 21, 1986, Pat. No.
4,821,972.

[51] Int. Cl.⁴ B65H 35/00

[52] U.S. Cl. 242/56 R

[58] Field of Search 242/58, 56 R, 78.8,
242/58.4; 83/191, 154, 152, 338, 341

[56] References Cited

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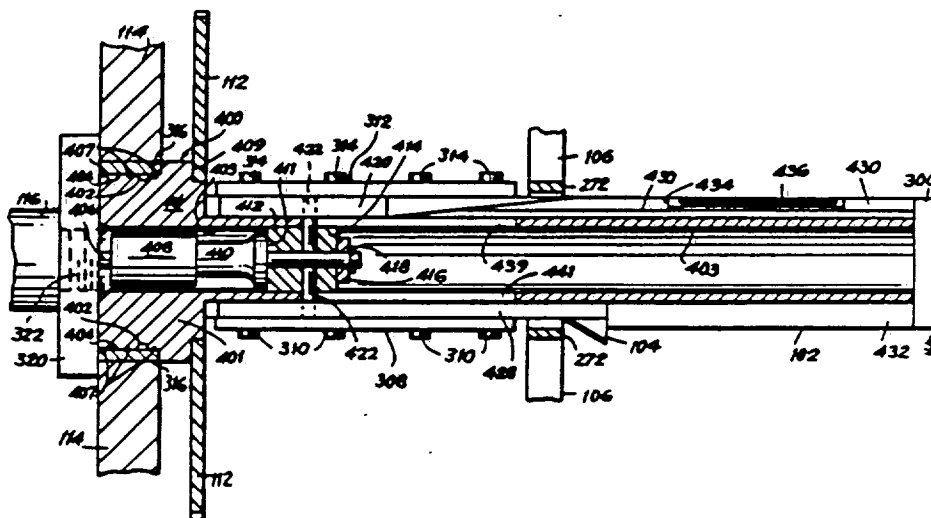
Primary Examiner—David Werner

Attorney, Agent, or Firm—Wayne M. Kennard

[57] ABSTRACT

A system and method for handling and delaminating a bobbin of sheet-like material, such as tipping paper, comprising a delaminator apparatus (100), a robotic arm assembly (182) having a robotic hand (185) connected thereto and a control console (212) for controlling the delaminator apparatus (100), the robotic arm assembly (182) and robotic hand (185) connected to the robotic arm assembly (182).

6 Claims, 11 Drawing Sheets



2026230386

[54] TOBACCO FEEDING APPARATUS

[75] Inventors: Michael Lauenstein, Cormondrèche;
Bernard Tallier, Gorgier, both of
Switzerland

[73] Assignee: Fabriques de Tabac Reunies, S.A.,
Neuchatel, Switzerland

[21] Appl. No.: 268,989

[22] Filed: Nov. 9, 1988

[30] Foreign Application Priority Data

Nov. 16, 1987 [CH] Switzerland 4450/87

[51] Int. Cl.³ A24C 5/39

[52] U.S. Cl. 131/110; 131/108;
131/109.1; 131/109.2; 131/84.3

[58] Field of Search 131/110, 108, 109.1,
131/109.2, 84.1, 84.3

[56] References Cited

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2139870 11/1984 United Kingdom

Primary Examiner—V. Millin

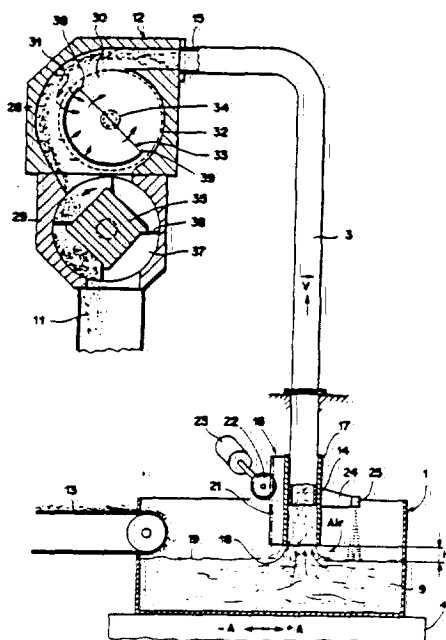
Assistant Examiner—Jennifer L. Doyle

Attorney, Agent, or Firm—Jeffrey H. Ingerman

[57] ABSTRACT

In apparatus for feeding tobacco to cigarette-making machines, the tobacco (9) is conveyed by suction from a feed receptacle (1). One end (14) of a duct (3) facing the receptacle above the level (19) of the tobacco is provided with a device (16) for regulating the rate of tobacco delivery in order to allow continuous feeding of the cigarette-making machine. The regulating device comprises a movable sleeve (17) slidable on the end portion (14) of the duct so that the bottom rim (18) of the sleeve is always at a required distance H from the level of the tobacco, this distance being continuously detected by a sensor (25), and the quantity of tobacco drawn into the duct to be adapted to the rate of production being a function of H. The other end (15) of the duct opens out into a tangential separator (12). The regulating device combined with the tangential separator makes it possible to reduce damage to the particles of tobacco.

8 Claims, 3 Drawing Sheets



2026230387

United States Patent [19]
Grollimund et al.

[11] **Patent Number:** 4,934,624
[45] **Date of Patent:** Jun. 19, 1990

- [54] **A ROBOTIC HAND**
[75] **Inventors:** Everett C. Grollimund, Midlothian;
Donald L. Brookman; Steven F.
Spiers, both of Richmond, all of Va.
[73] **Assignee:** Philip Morris, Inc., New York, N.Y.
[21] **Appl. No.:** 307,002
[22] **Filed:** Feb. 6, 1989

Related U.S. Application Data

- [62] Division of Ser. No. 820,665, Jan. 21, 1986, Pat. No.
4,821,972.
[51] **Int. CL⁵** B65H 19/10; B66C 1/00;
B25J 11/00
[52] **U.S. CL** 242/72.1; 414/736;
414/911
[58] **Field of Search** 242/58.4, 78.8, 72 R,
242/72.1, 67.3 R; 901/6; 414/736, 744 A, 751,
776, 908, 911; 279/2 R, 2 A

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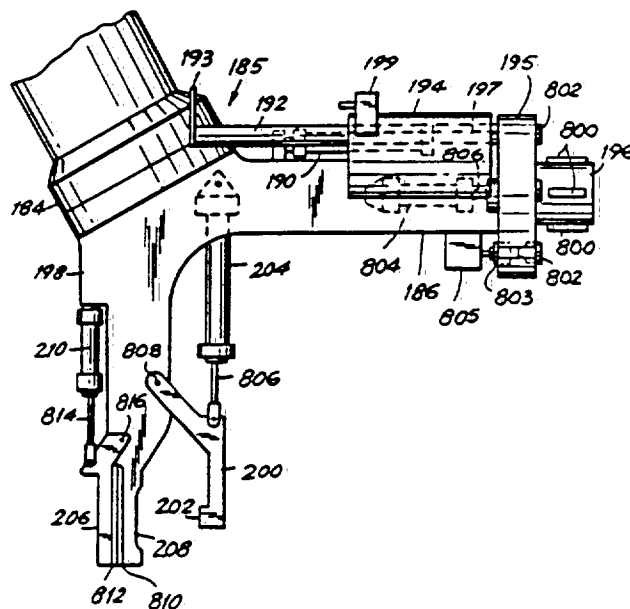
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Primary Examiner—David Werner
Attorney, Agent, or Firm—Wayne M. Kennard

[57] **ABSTRACT**

A robotic hand has two sections disposed 90 degrees apart. One section has a bobbin core-engaging device for the purpose of lifting and handling the bobbin. This section also has a bobbin transfer means for removing the bobbin from the bobbin core engaging device. The second section of the robotic hand has a first fixed finger and a second movable finger. The fingers are used for clamping at least one lamination thickness of paper from the bobbin therebetween and holding it while the robotic hand is indexed to thread a processing machine with the paper from the bobbin. The second section also has a bobbin core removing means formed by the first fixed finger and a movable third finger. The first and third fingers cooperate for engaging the bobbin core and removing it from the machine after all of the paper has been removed therefrom.

14 Claims, 11 Drawing Sheets



2026230388

V. OPTICAL PROCESSING/
QUALITY MEASUREMENTS

2026230389

United States Patent [19]

Banyasz et al.

[11] Patent Number: 4,890,053

[45] Date of Patent: Dec. 26, 1989

[54] METHOD AND APPARATUS FOR
DETECTING A MISSING OBJECT IN A SET
OF OBJECTS

[75] Inventors: Joseph L. Banyasz; Aubrey T. Burton;
Bernard C. LaRoy; David A. Lowitz,
all of Richmond, Va.

[73] Assignee: Philip Morris Incorporated, New
York, N.Y.

[21] Appl. No.: 182,171

[22] Filed: Apr. 15, 1988

[51] Int. Cl.⁴ G01R 27/04

[52] U.S. Cl. 324/58.5 A; 324/58.5 R;
324/58 A; 340/673; 340/674

[58] Field of Search 340/673, 674; 324/58 R,
324/58 A, 58.5 A, 58.5 R

[56] References Cited

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nas," *Microwave Journal*, Jul. 1984, (Millitech Corpora-
tion reprint, Sep. 1984).

Primary Examiner—Reinhard J. Eisenzopf

Assistant Examiner—Jose M. Solis

Attorney, Agent, or Firm—Jeffrey H. Ingberman

[57] ABSTRACT

A millimeter wave detector for detecting missing ciga-
rette packs or other types of objects in a set of objects is
provided. The detector uses millimeter wave radiation
at about 90 GHz to resolve small features of the objects
being scanned. The detector can detect defects or miss-
ing packs in configurations that would not be detected
by previously known detectors.

20 Claims, 9 Drawing Sheets

2026230390

[54] METHODS AND APPARATUS FOR OPTICAL PRODUCT INSPECTION

[75] Inventor: David P. Casasent, Pittsburgh, Pa.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 115,428

[22] Filed: Oct. 30, 1987

[51] Int. Cl.⁴ G01B 11/00

[52] U.S. Cl. 356/394; 382/8; 382/41

[58] Field of Search 356/394; 382/8, 25, 382/41, 46, 30; 350/433

[56] References Cited

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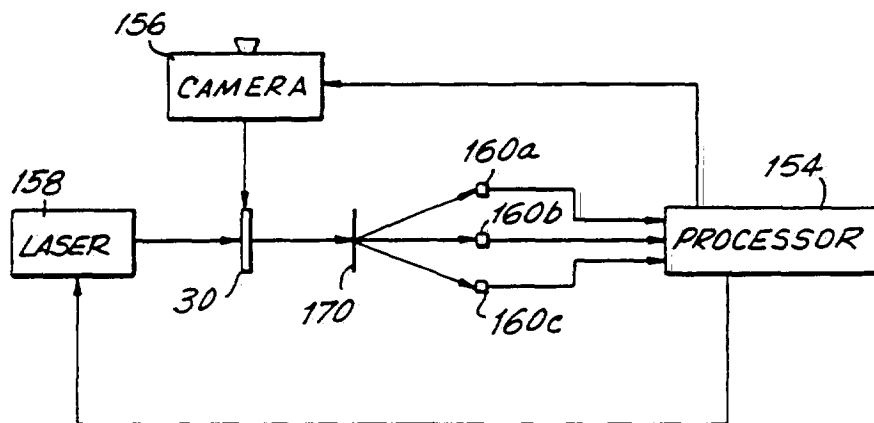
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Primary Examiner—Richard A. Rosenberger
Attorney, Agent, or Firm—Robert R. Jackson

[57] ABSTRACT

Products having optically detectable straight line segments are inspected for acceptability by forming one or more one-dimensional images of the product in which properly aligned straight line segments are respectively focused to points in the image. Such parameters as the location and image intensity of these one-dimensional image points are used to determine whether or not the product is acceptable. An optical Hough transform underlies these product inspection techniques.

34 Claims, 18 Drawing Sheets



2026230391

[54] METHODS AND APPARATUS FOR OPTICALLY ENHANCING SELECTED FEATURES IN AN INPUT IMAGE

[75] Inventor: Charles N. Harward, Midlothian, Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 274,029

[22] Filed: Nov. 21, 1988

[51] Int. Cl.⁵ H04N 5/66

[52] U.S. Cl. 358/230; 350/334; 350/337

[58] Field of Search 350/340, 341, 334, 337; 358/230

[56] References Cited

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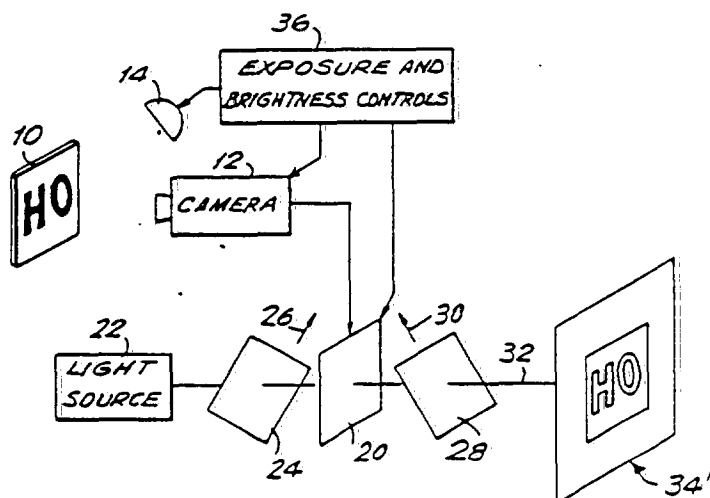
Primary Examiner—John K. Peng

Attorney, Agent, or Firm—Robert R. Jackson

[57] ABSTRACT

Input image features of predetermined brightness are enhanced in an output image by processing the input image using a liquid crystal display in conjunction with specially oriented light polarizing devices.

14 Claims, 4 Drawing Sheets



2026230392

[54] INSTRUMENT FOR MEASURING PACKAGE SEALS

[75] Inventors: J. Jerome Fleenor, Midlothian;
Christopher N. Chance, Richmond;
Robert T. Mitten, Glen Allen, all of
Va.

[73] Assignee: Philip Morris Incorporated, New
York, N.Y.

[21] Appl. No.: 331,598

[22] Filed: Mar. 30, 1989

[51] Int. Cl.⁵ G01M 3/32

[52] U.S. Cl. 73/49.3; 73/52

[58] Field of Search 73/49.3, 52, 45.4;
53/53

[56] References Cited

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Primary Examiner—Jerry W. Myracle

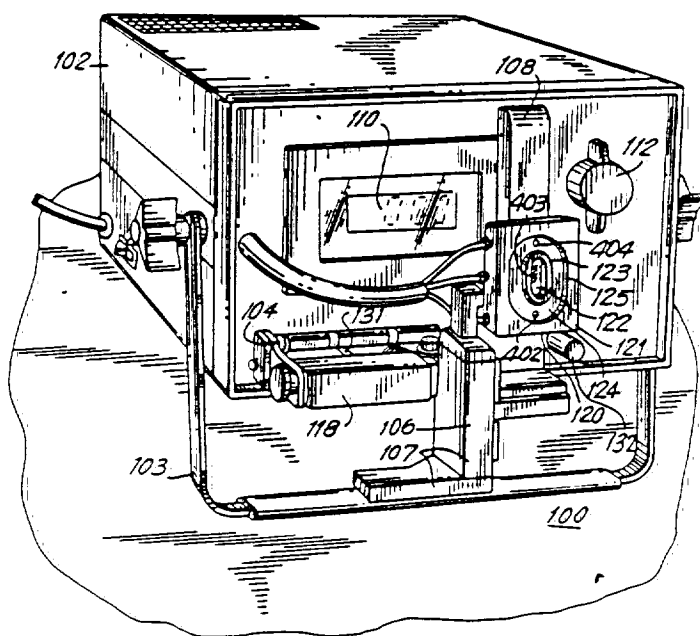
Assistant Examiner—Joseph W. Roskos

Attorney, Agent, or Firm—John R. Storella; Mark D.
Rowland

[57] ABSTRACT

An apparatus for testing the quality of a seal on a package overwrap having a cutting or burning element to create a hole in the package overwrap without breaching the integrity of the package; a measuring head for introducing super-atmospheric air pressure through the hole between the overwrap and the package; and a pressure transducer for determining whether the rate of air leakage from the overwrap is within acceptable limits.

20 Claims, 6 Drawing Sheets



2026230393

[54] APPARATUS AND METHOD FOR MEASURING TWO PROPERTIES OF AN OBJECT USING SCATTERED ELECTROMAGNETIC RADIATION

[75] Inventor: David A. Lowitz, Richmond, Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 342,872

[22] Filed: Apr. 25, 1989

[51] Int. Cl.⁵ G01R 27/04

[52] U.S. Cl. 324/631; 324/638;
324/632; 324/643; 324/634; 131/905

[58] Field of Search 131/905, 906, 908;
324/631, 638, 632, 643, 634

[56] References Cited

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Primary Examiner—Reinhard J. Eisenzopf

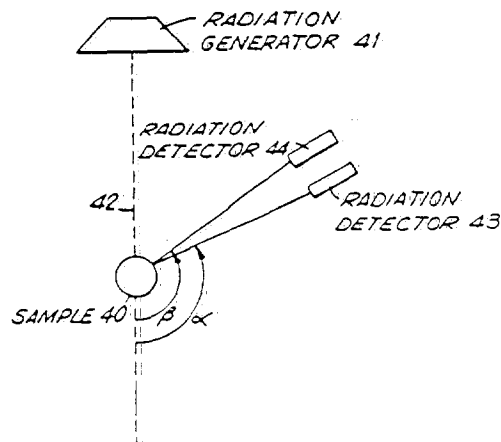
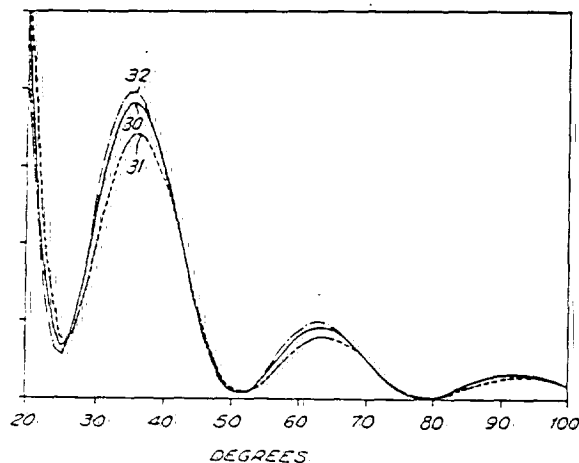
Assistant Examiner—Jose M. Solis

Attorney, Agent, or Firm—Jeffrey H. Ingerman

[57] ABSTRACT

A method and apparatus for monitoring two components of an object, such as moisture content and density in a tobacco rod, using scattered electromagnetic radiation are provided. The invention relies on the fact that both the real imaginary parts of the dielectric constant of water vary greatly over frequencies in the gigahertz region while those of the remaining constituents of tobacco do not, and particularly on the fact that, at frequencies approaching 100 GHz, the real part of the dielectric constant of water is much closer to that of many organic polymers, such as those making up tobacco, than it is at lower frequencies, and the imaginary part of the dielectric constant of water is much lower at frequencies approaching 100 GHz than it is in the region of 20 to 30 GHz. By comparing the scattering of electromagnetic radiation by the object—i.e., the cigarette rod—at two different frequencies and using a pre-determined calibration curve based on a cigarette rod having a desired moisture content and density, one can determine the moisture content and density of the cigarette rod. If the monitoring is taking place on a cigarette making machine and the moisture content and density deviate from their desired values, the machine feeds can be adjusted automatically to restore the desired moisture content and density.

35 Claims, 6 Drawing Sheets



2026230394

VI. NEW PRODUCTS/PROCESSES

2026230395

[54] METHOD AND APPARATUS FOR DRYING AND COOLING EXTRUDED TOBACCO-CONTAINING MATERIAL

[75] Inventors: Ronald A. Tamol; Jose G. Nepomuceno; Gus D. Keritsis; George H. Burnett, all of Richmond; Richard A. Thesing, Glen Allen; Warren D. Winterson, Midlothian; Walter A. Nichols, Richmond, all of Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 74,990

[22] Filed: Jul. 17, 1987

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 900,715, Aug. 27, 1986, which is a continuation-in-part of Ser. No. 740,325, Jun. 3, 1985, Pat. No. 4,632,131, which is a continuation-in-part of Ser. No. 627,407, Jul. 3, 1984, abandoned, which is a continuation-in-part of Ser. No. 723,883, Apr. 16, 1985, Pat. No. 4,625,737, which is a continuation of Ser. No. 457,505, Dec. 30, 1982, Pat. No. 4,510,950.

[51] Int. Cl.⁴ A24B 3/14
[52] U.S. Cl. 131/375; 131/294
[58] Field of Search 131/299, 294, 295, 375

[56] References Cited

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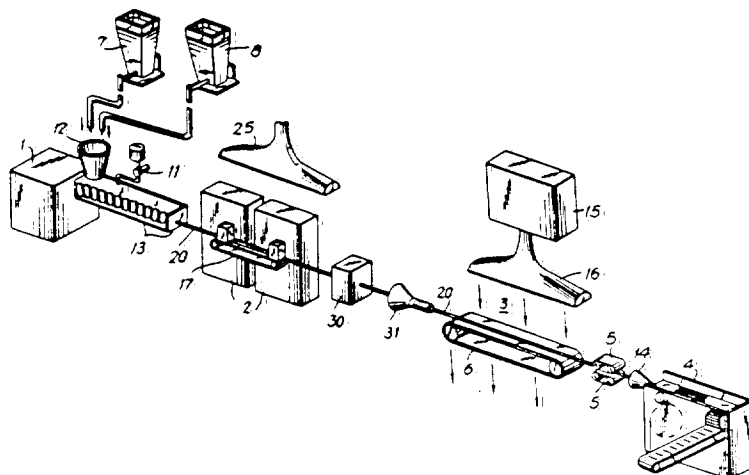
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Robert M. Isackson

[57] ABSTRACT

Apparatus and a method for processing hot, moist extruded tobacco-containing materials as they are continuously extruded by drying the extruded material rapidly with microwave energy, and then cooling the extruded material rapidly so that the surface temperature of the extruded material is decreased below the bulk temperature to provide the extruded material with an adequately rigid and stable dimensionally structure that can be formed into a smoking article. Microwave drying provides substantially uniform drying without case hardening the material. Cooling may occur by passing air at high velocity, refrigerated air or presenting a partial vacuum across the advancing extruded material, or contacting the material with cold contacting members or a cryogenic bath. Conventional maker devices can be used for forming smoking articles from the dried and cooled extruded material. The invention is useful particularly to process foamed, extruded materials into smoking articles which can be used with conventional cigarette maker equipment to produce large quantities of foamed, extruded tobacco-containing smoking articles having properties substantially equivalent to those of a conventional cigarette.

43 Claims, 1 Drawing Sheet



2026230396

United States Patent [19]

Keritsis et al.

[11] Patent Number: 4,936,920

[45] Date of Patent: Jun. 26, 1990

[54] HIGH VOID VOLUME/ENHANCED FIRMNESS TOBACCO ROD AND METHOD OF PROCESSING TOBACCO

[75] Inventors: Gus D. Keritsis, Richmond; Robert S. Mullins, Manakin-Sabot; Jose G. Nepomuceno; Lewis A. Haws, both of Richmond, all of Va.; Harry A. Jones, Boynton Beach, Fla.; Veronica Y. Manuel, Highland Springs; Wesley G. Sanderson, both of Richmond, Va.; John F. Sherwood; Warren D. Winterson, both of Midlothian, Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 166,005

[22] Filed: Mar. 9, 1988

[51] Int. Cl.³ A24C 5/00; A24C 5/14

[52] U.S. Cl. 131/77; 131/78; 131/79; 131/84.1; 131/352; 131/364; 493/43; 493/49

[58] Field of Search 131/355, 359, 369, 364; 131/77, 78, 79, 84.1, 364, 352, 39, 42, 43, 44, 49

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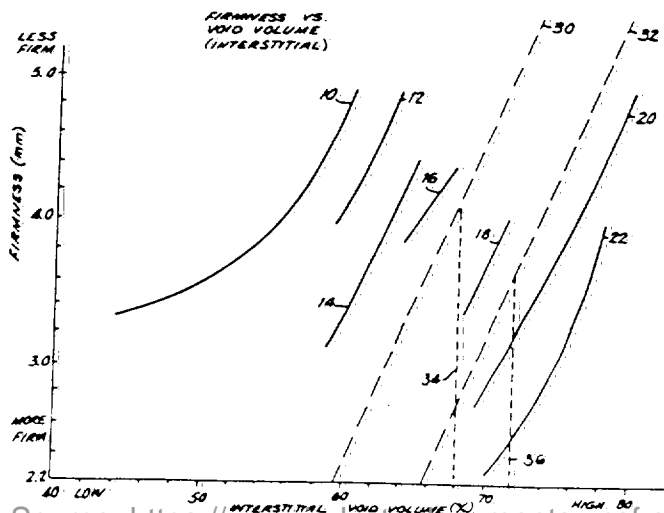
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Donald E. Degling; Mitchell P. Brook

[57] ABSTRACT

A tobacco product characterized by improved void volume and firmness characteristics and a method of making a tobacco product by applying binder material to tobacco filler, treating the filler to the extent necessary to cause the filler to become substantially non-tacky, forming a rod, activating the binder and treating the rod to the extent necessary to cause the filler shreds to become bonded to one another.

38 Claims, 5 Drawing Sheets



2026230397

VII. DEFENSIVE DISCLOSURES

2026230398

Item 23

TITLE : PINNED FEEDER CLEANING ARRANGEMENT
INVENTOR(S) : HINTON C M; ZIMMERMAN D R; SEMP B A
ASSIGNEE : PHILIP MORRIS
ABSTRACT : ARRANGEMENT OF BRUSHES AND SPRAYS DESIGNED TO CLEAN PIN
FEEDERS AND TO REDUCE THE BACTERIAL LOAD ENCOUNTERED BY
THE PRODUCT.
PM NUMBER/DATE : D416

Item 24

TITLE : BULK TOBACCO HANDLING SYSTEM COMPRISED OF A ENCLOSED
TRAILER WITH A BELT DRIVEN FLOOR AND A MODIFIED TOBACCO
SILO
INVENTOR(S) : MACHETT J M
ASSIGNEE : PHILIP MORRIS
ABSTRACT : THIS HANDLING SYSTEM WILL ELIMINATE THE USE OF CONTAINERS,
HOGSHEADS, OR CASES FOR THE DIRECT SHIPMENT OF TOBACCO
PRODUCTS BETWEEN LOCAL PROCESSING FACILITIES. IT IS COST
EFFECTIVE AND ASSURES MINIMAL PRODUCT DEGRADATION.
KEYWORDS : TRUCK; HANDLING; ENCLOSED; BELT; SILO
PM NUMBER/DATE : D421

Item 25

TITLE : IMPROVED PNEUMATIC SEPARATOR
INVENTOR(S) : ABEL M J; JONES D R; SIMS G M
ASSIGNEE : PHILIP MORRIS
ABSTRACT : IMPROVEMENTS TO A CARDWELL RPAL SEPARATOR. ELIMINATES
NEED FOR PRE-SCREENING OF LARGE TOBACCO PADS UPSTREAM OF

THE SEPARATOR; ELIMINATES DOWN TIME FROM CHOKE-UP OF THE
SEPARATOR ROTARY WINNOWER; REDUCES MAINTENANCE
REQUIREMENTS; ELIMINATES THE NEED FOR A VIBRATING CONVEYOR
TO FEED THE SEPARATOR WINNOWER; IMPROVES SEPARATION
EFFICIENCY.
KEYWORDS : SEPARATE
PM NUMBER/DATE : D419-1

2026230399

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Appendix G

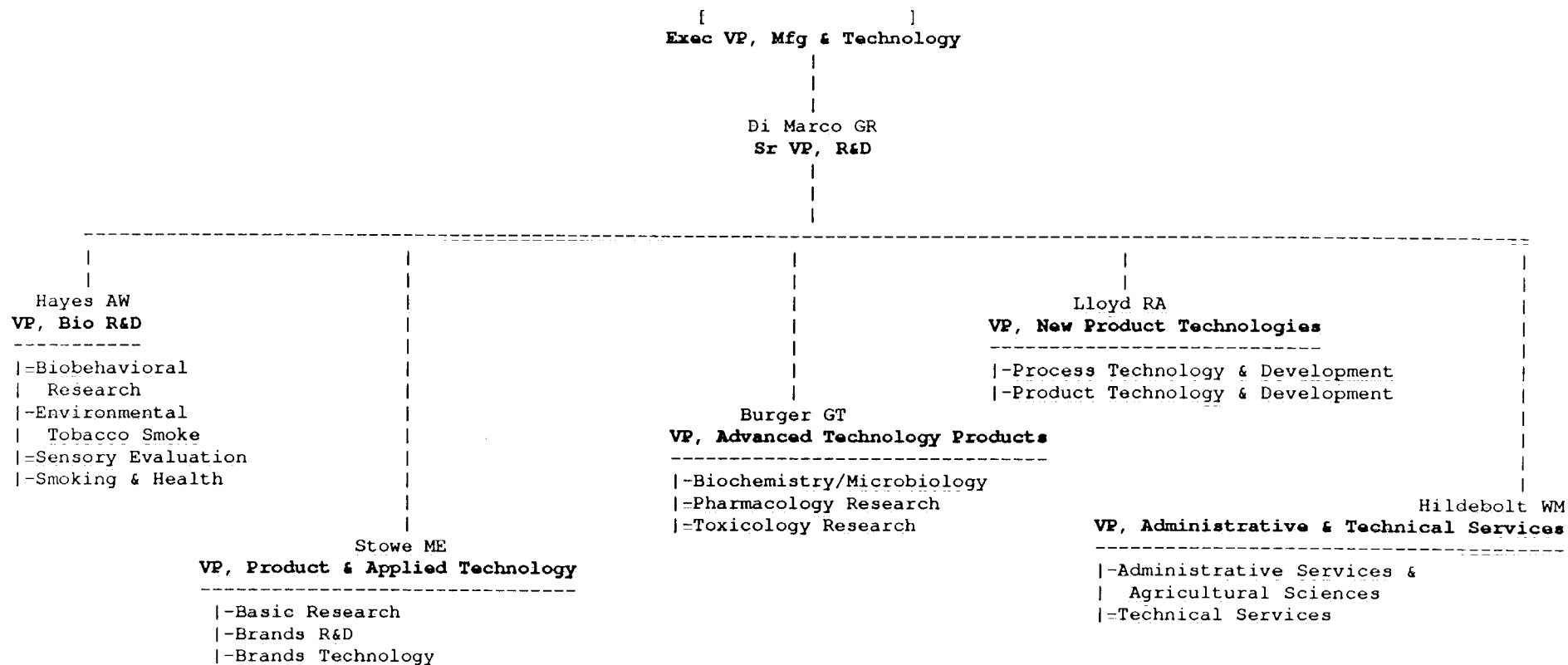
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APPENDIX G

RJR R&D Organization Chart

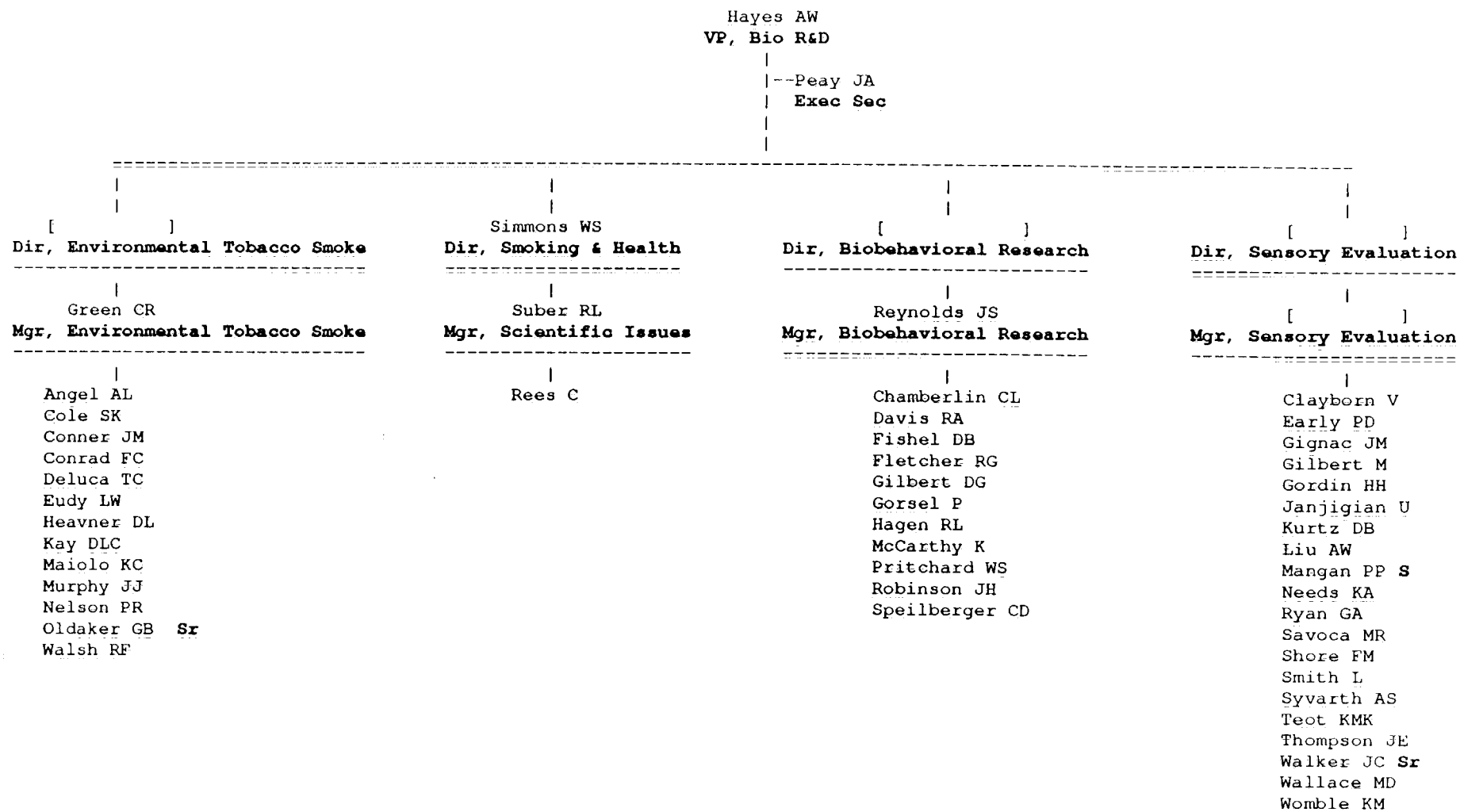
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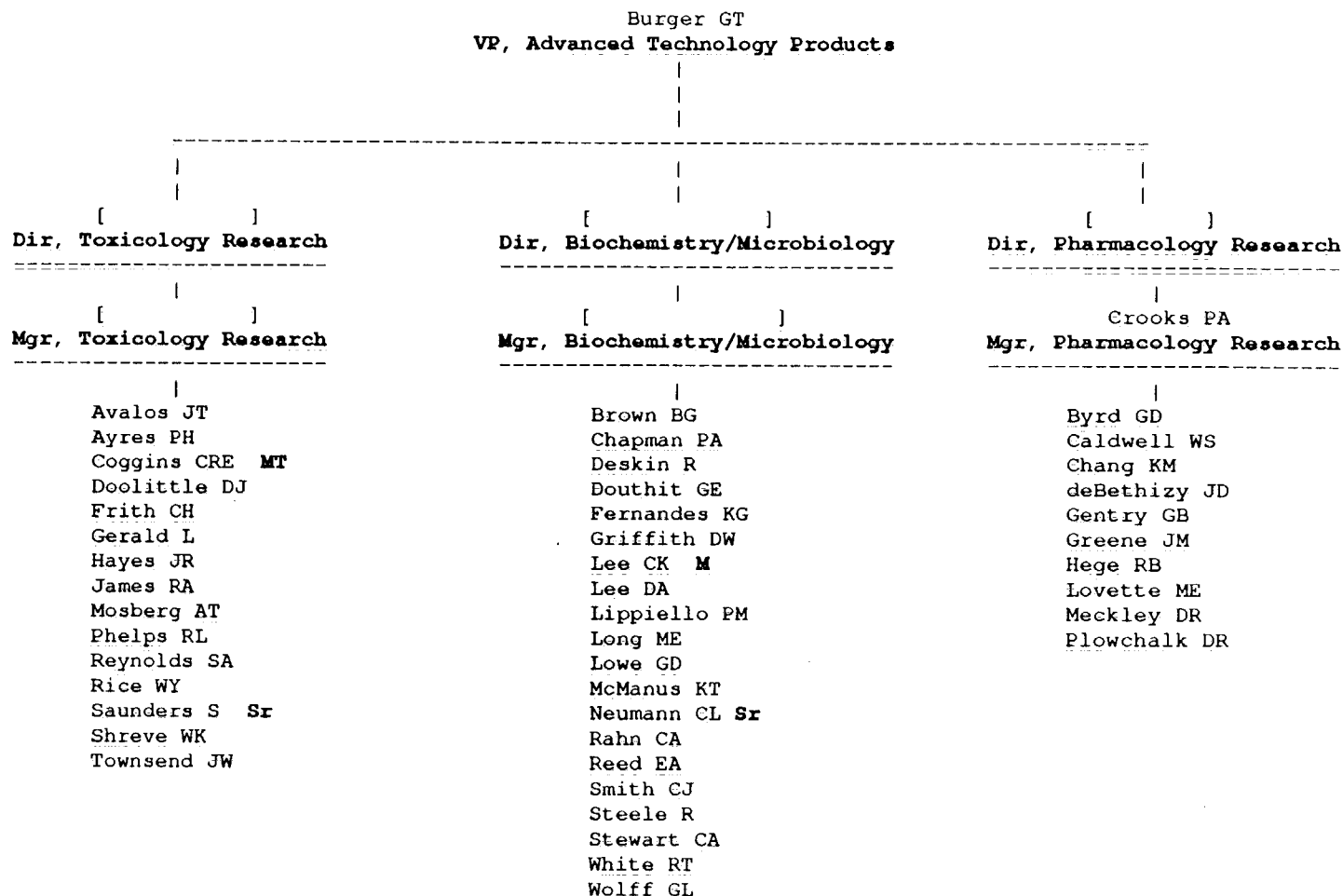
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S = Scientist
Sr = Senior Scientist

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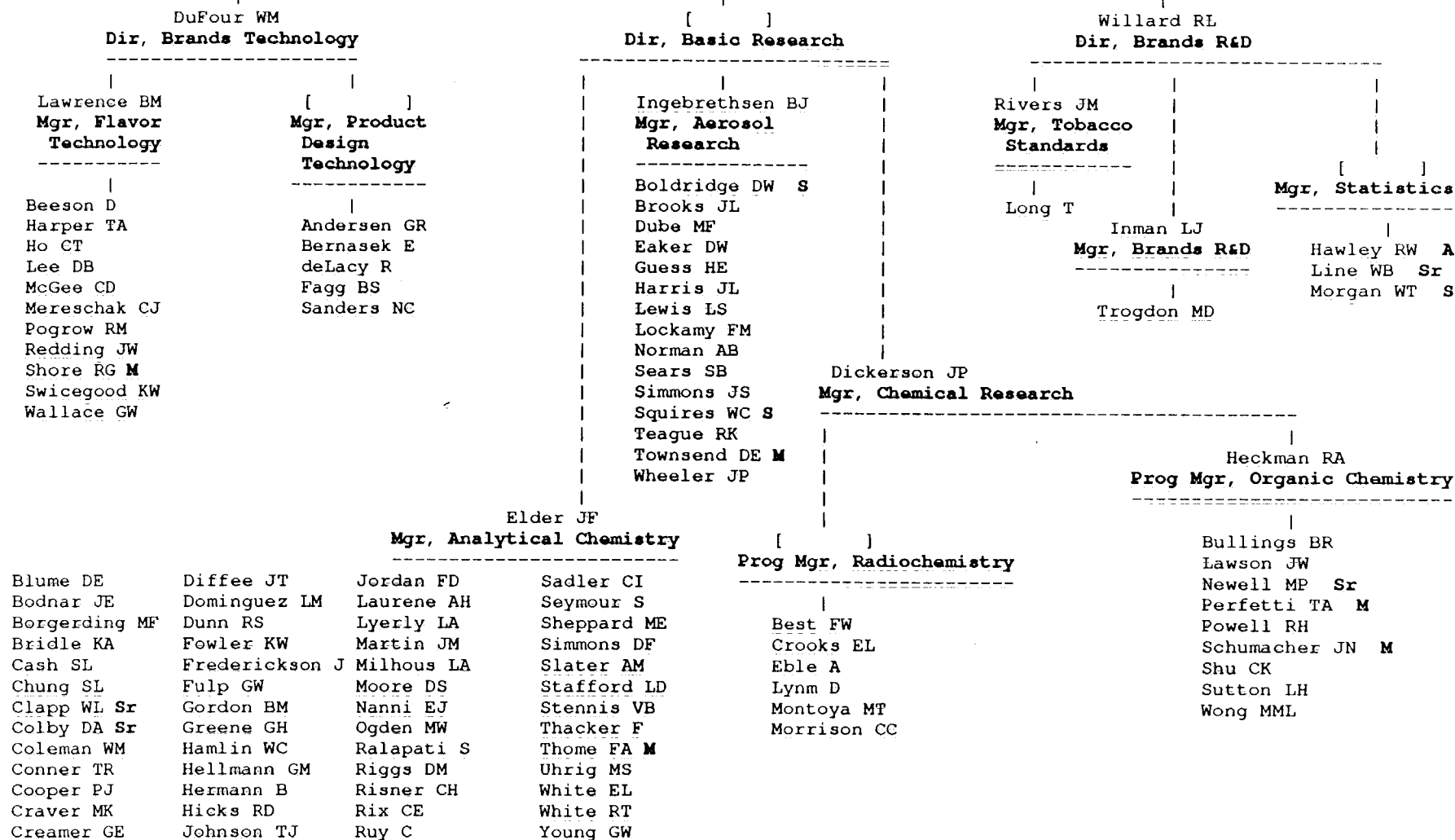


M = Master Scientist
MT = Master Toxicologist
Sr = Senior Scientist

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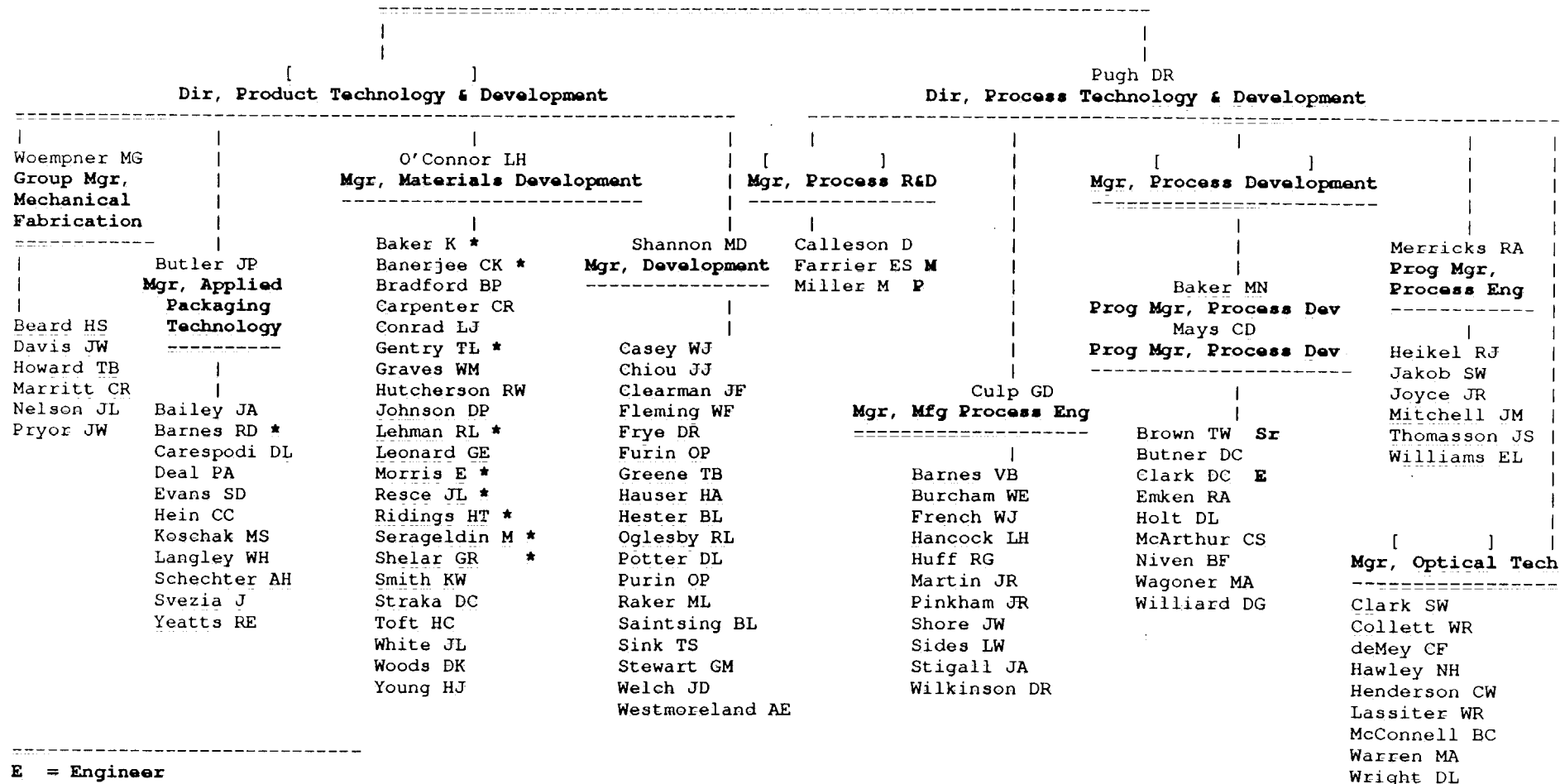
Stowe ME
VP, Product & Applied Technology
---Sensabaugh AJ
Principal Scientist



M = Master Scientist
S = Scientist
Sr = Senior Scientist

6070E29202

Lloyd RA
VP, New Product Technologies

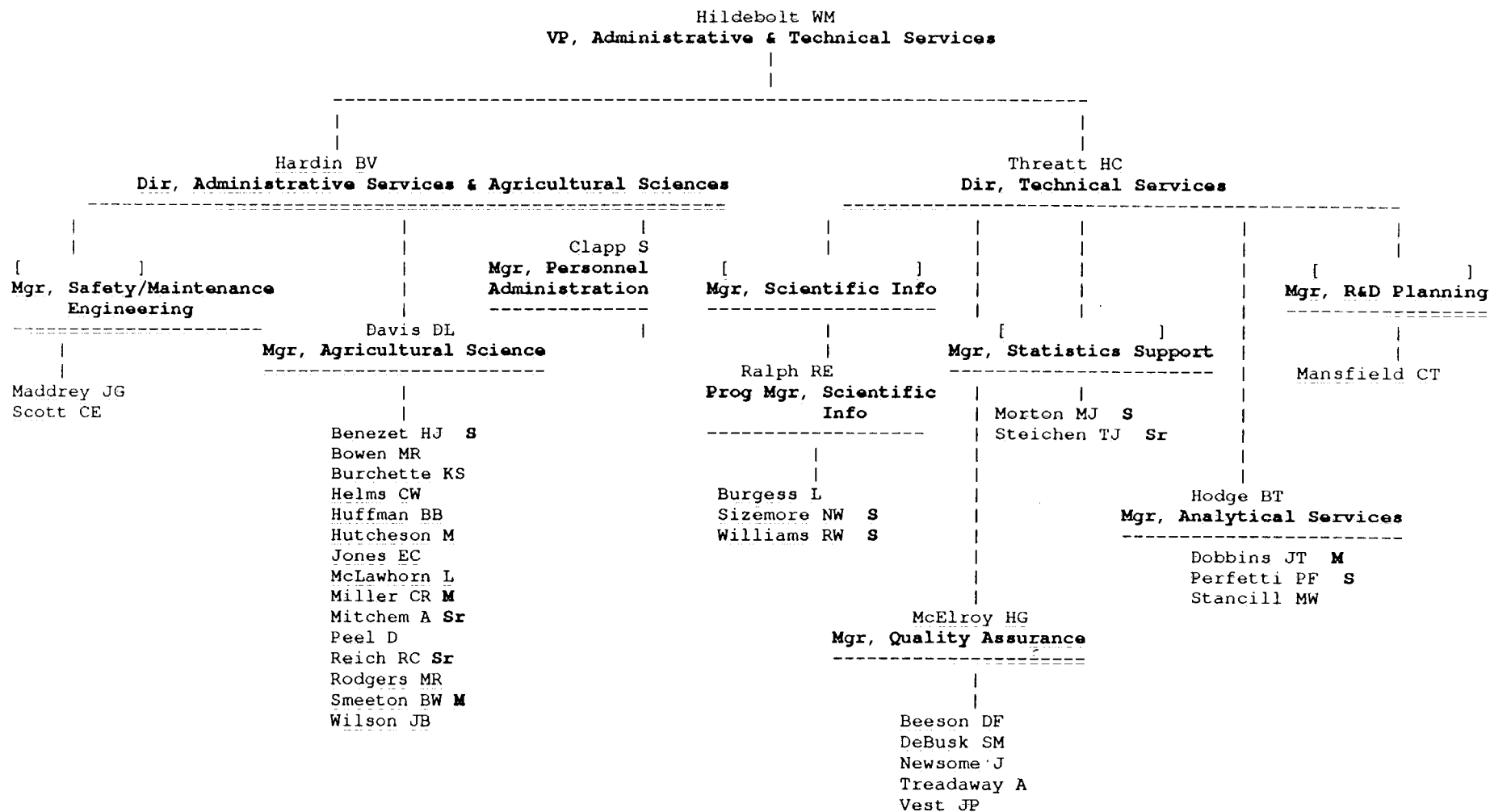


E = Engineer
M = Master Engineer
P = Principal Engineer
Sr = Senior Engineer

* These are people previously designated to the "Smokeless Cigarette" division.

NOTE: Both Baker and Mays were promoted to the same position title in the same year.

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M = Master Scientist
S = Scientist/Statistician
Sr = Senior Scientist/Statistician/Coordinator

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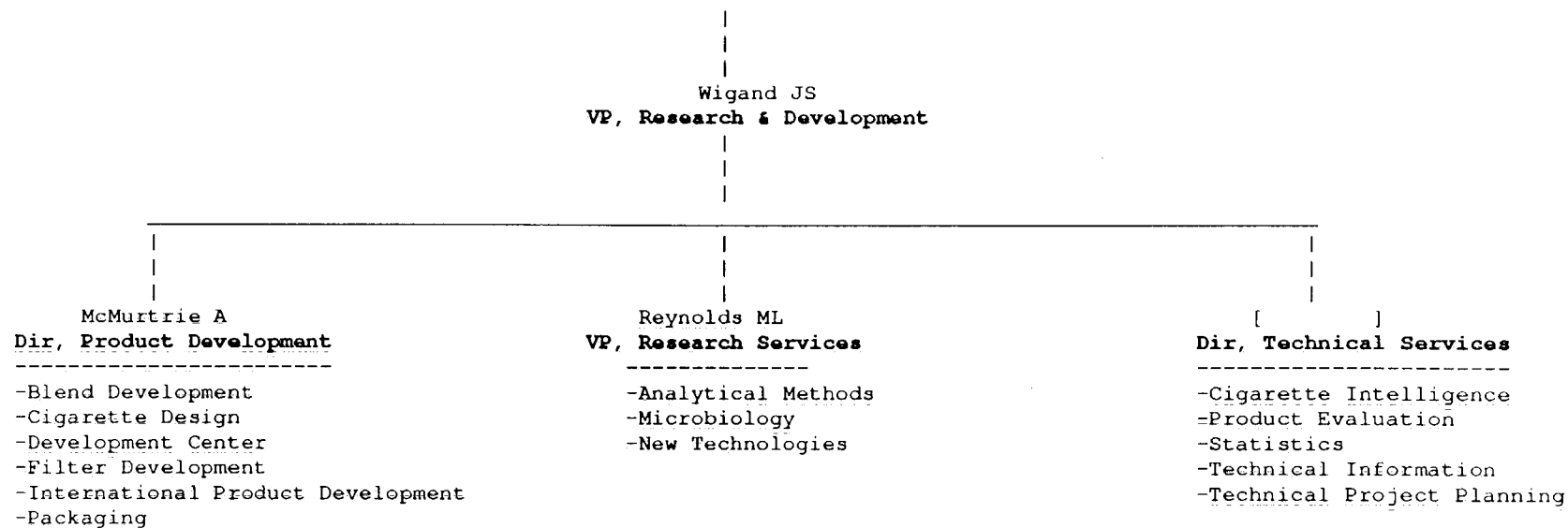
Appendix H

APPENDIX H

B&W R&D Organization Chart

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2026230414

bw-chart.2
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McMurtrie A
Dir, Product Development

===Johnson RR P

Wilson R
Mgr, Blend Development

Bandy B
Mgr, Development Ctre*

[]
Mgr, International Product Dev

Adams SM A
Allen TL
Sachleben LR
Snyder DD

St. Charles FK
Mgr, Filter Development

Heaney R
Jones RL
Lowe BL
Maccaferri MA
Manecke KA
McDaniel WM
Naslund EI
Reed SP
Silberstein DA
Sullivan JW
Tribbey P
Vester RP

[]
Mgr, Cigarette Design

Cantrell DV
Gonterman RA
Riley KA
Roth DA
Scholten DL
Zielke MW C

Frank DM

Flaherty KA
Mgr, Packaging

Emery CN
Huber DJ
Kunkel L
Lewis T
Radley CP
Tudor TT

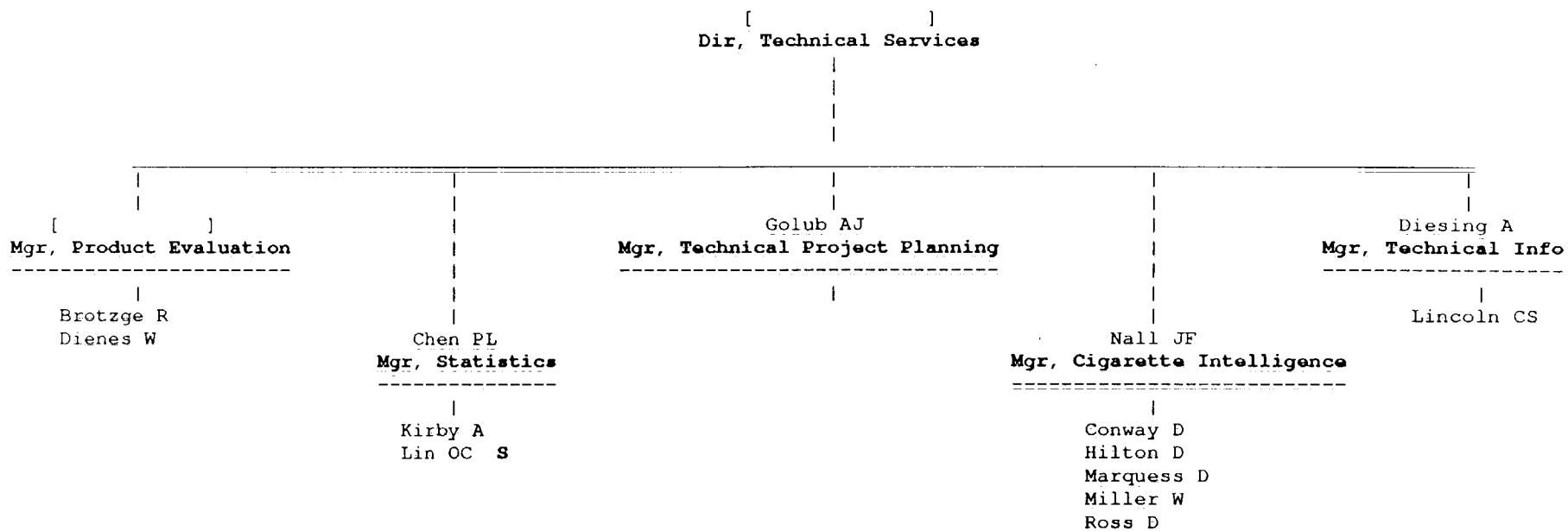
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* Pilot Plant

A=Associate Leaf Blender
C=Development Chemist

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bw-chart.3

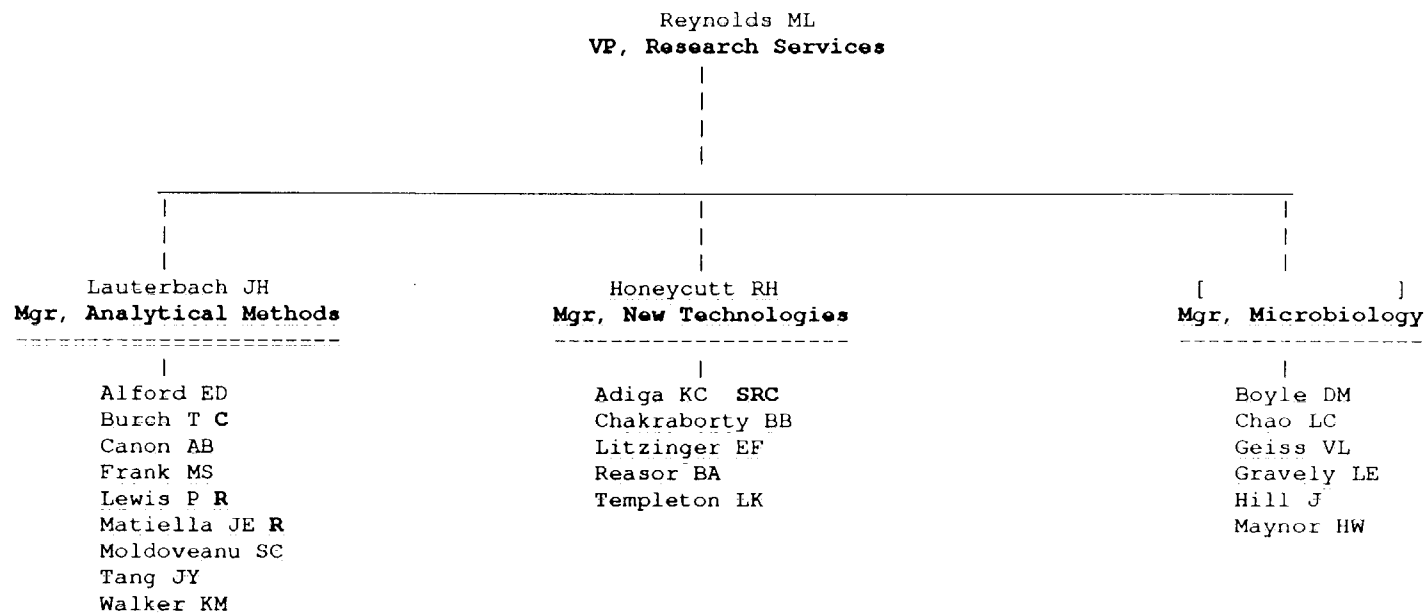
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S=Statistician

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bw-chart.4
10/23/90



C =Chemist
R =Research Chemist
SRC=Senior Research Chemist

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Appendix I

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APPENDIX I

JTI Annual Report and Brochures

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JAPAN TOBACCO INC. ANNUAL REPORT 1989 二

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CORPORATE PROFILE

Japan Tobacco Inc. was originally established in 1898 as a government bureau to operate a monopoly in tobacco. In 1905, the Japanese government added salt to its operations, and in 1949, the bureau became Japan Tobacco and Salt Public Corporation. This corporation was Japan's sole producer of tobacco and salt products until April 1985, when it was privatized and reestablished as Japan Tobacco Inc., a joint stock company fully owned by the Japanese government. At present, the Company maintains its leading position in the domestic tobacco industry with an 87.9% market share while continuing to serve the public's needs for salt products. In terms of sales, Japan Tobacco is the fourth largest tobacco company in the world and also ranks as one of the companies in Japan with the highest turnover.

As one of Japan's largest companies with abundant financial, technical, and human resources at its disposal, Japan Tobacco is continuing to explore new business opportunities while strengthening its more recently acquired businesses. Main directions of growth where Japan Tobacco is aiming to carve a niche include pharmaceuticals, agribusiness, and engineering. These business areas, along with tobacco, are expected to form a new foundation for the Company in the 21st century and beyond.

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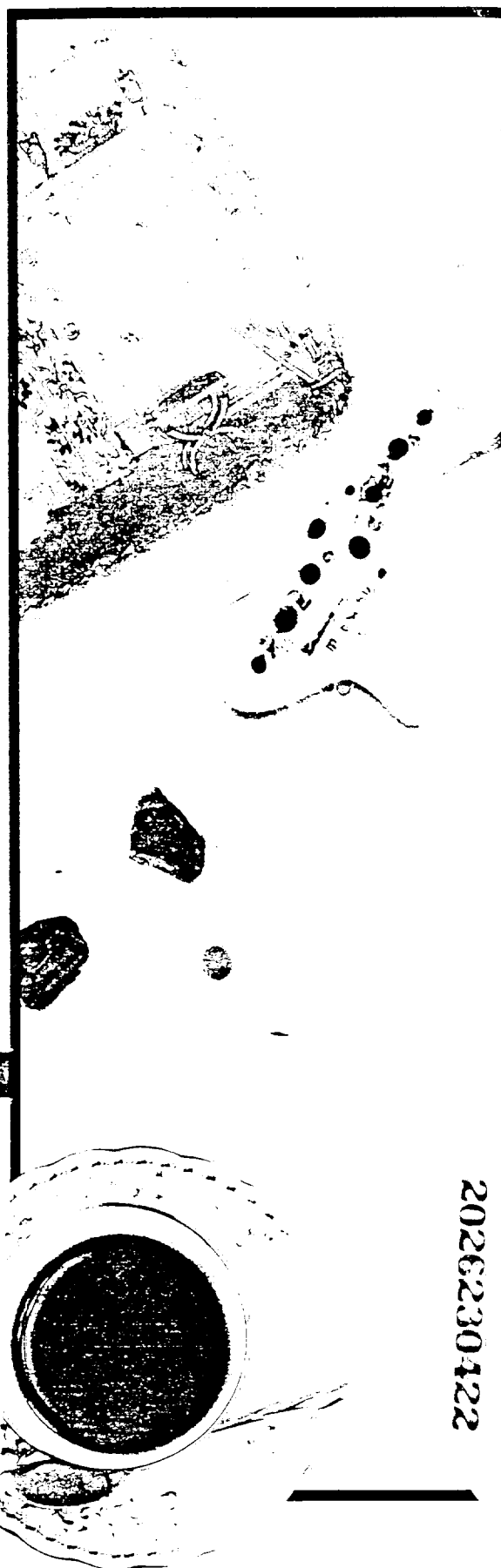
For nearly a century, Japan Tobacco has developed and honed its craft in the tobacco and salt industries. The Company is now recognized globally as an industry leader for its track record in research and technology in these industries. In Japan, we are regarded as a responsible and reliable corporate citizen, committed to the supply and development of quality products for our customers. While the Company remains obligated to serve the Japanese public as the sole agent and producer of salt products, gradual changes in government policy and rapid advances in technology have transformed its operating environment in tobacco. With privatization, Japan Tobacco is now in a better position to determine its own destiny by applying its accumulated technological expertise in areas outside of its present main areas of business.

Our roots lie in the tobacco and salt industries, but to meet and anticipate changes in our operating environment, we are seeking to expand our operations in both domestic and international markets. At present, we are continuing our diversification program into such areas as pharmaceuticals, agribusiness, and engineering. To better reflect these expanded operations, the Company elected to use "JT" as a communication logo in tandem with its corporate name, Japan Tobacco Inc.

Because our confidence to diversify

JT **EXPLORING NEW HORIZONS**

into new businesses originates from a rich history in the tobacco industry, we will continue to strengthen our tobacco business even as we seek to explore other avenues for growth in the future. This reflects our belief that strength in the tobacco industry will continue to play an important role in our future operations as we seek to better serve the needs of the community.



2026230422



June 1989

Shigeru Mizuno

Shigeru Mizuno
President and Chief Executive Officer

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In reviewing our business results for the year ended March 31, 1989, I am pleased to report on the progress we have made in working to enhance Japan Tobacco's operations. During the year, we worked to strengthen our competitiveness in the tobacco industry while continuing to expand our new areas of business.

Our Business Development

Although the Japanese economy remained strong in fiscal 1989 with an increase in overall consumption, our main business, domestic tobacco production, continued to face the challenges posed by leveled-off consumer demand for tobacco products and strict competition from other tobacco manufacturing companies. By meeting these challenges head on with the timely introduction of new brands developed to meet changing consumer tastes, extensive advertising, and sales promotion efforts, we were able to maintain a total market share of 87.9%.

Our growth in tobacco exports continued throughout fiscal 1989, increasing 62.0% in volume.

In addition to our tobacco business, we continued to pursue a program of diversification into such fields as pharmaceuticals and agribusiness for long-term future development. To fully utilize our resources and advanced technologies, we completely reorganized our research

Future Outlook

We believe that the domestic market for tobacco products will pose further challenges in the future based on frequently changing consumer tastes and ever intense competition. We plan to meet these challenges by responding flexibly to market demand by introducing innovative and creative products designed to meet varied consumer tastes. To attain the highest level of net income possible, we will continue to strengthen our product lines, reduce production costs, and enhance our marketing strategies. We also plan to continue promoting our tobacco exports worldwide in the interest of developing a global tobacco business.

Our diversification program will continue to play a major role in our future development. Founded on the advanced technologies, extensive distribution channels, and marketing capabilities developed through our tobacco activities, these areas of diversification—including pharmaceuticals, agribusiness, beverage production, and engineering—have been developed to provide consumers with a vast array of products specifically designed to meet market needs. We are committed to the development of prescription drugs that will help restore health and meet consumer needs. With these commitments, we are confident that our operations will increasingly

A MESSAGE FROM THE PRESIDENT

and development laboratories to best meet the needs of our new diversification programs. Also, we have initiated production and marketing of over-the-counter (OTC) drugs and of beverages through newly established companies. These efforts clearly illustrate the steady progress of our diversification program in fiscal 1989.

Although revenue contributions from our new businesses remain minor, our combined efforts in the tobacco and salt business helped us to achieve net sales of ¥2,723.9 billion (\$20.6 billion) and net income of ¥38.3 billion (\$290.0 million).

contribute to our growth.

Although our business environment does not allow us to be optimistic about the future, we believe that our accumulated experience of more than 90 years in the tobacco business will continue to provide a solid foundation from which future growth can be assured. In fiscal 1989 we took one more step toward strengthening that foundation, and we look forward to many more successful years to come.

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Japan Tobacco Inc.
Years ended March 31, 1988 and 1989

| | Millions of yen | | Millions of U.S. dollars |
|---|-----------------|------------|--------------------------|
| | 1988 | 1989 | 1989 |
| For the year: | | | |
| Net sales | ¥2,797,856 | ¥2,723,962 | \$20,636 |
| Net income | 36,889 | 38,328 | 290 |
| At year-end: | | | |
| Shareholder's equity | ¥ 976,184 | ¥1,006,443 | \$ 7,625 |
| Total assets | 1,518,044 | 1,501,466 | 11,375 |
| Amounts per share of common stock (in yen and U.S. dollars): | | | |
| Net income | ¥ 13,803 | ¥ 15,633 | \$ 118 |
| Cash dividends | 4,000 | 5,000 | 38 |
| Shareholder's equity | 455,405 | 467,004 | 3,538 |

Notes: 1. Figures stated in U.S. dollars in this report are translated solely for convenience at the rate of ¥132 per US\$1 as of March 31, 1989.

2. The amounts for net income, cash dividends, and shareholder's equity per share are related to the profit-oriented operations.

■ Through the development of new products and aggressive marketing, Japan Tobacco maintained its leading position in the Japanese tobacco industry with an 87.9% market share.

■ Tobacco exports rose 62.0% year to year in volume.

■ From April 1, 1988, Japan Tobacco's R&D activities were restructured to directly link each of the seven research arms with relevant operational divisions, and the Company also established two basic research organizations.

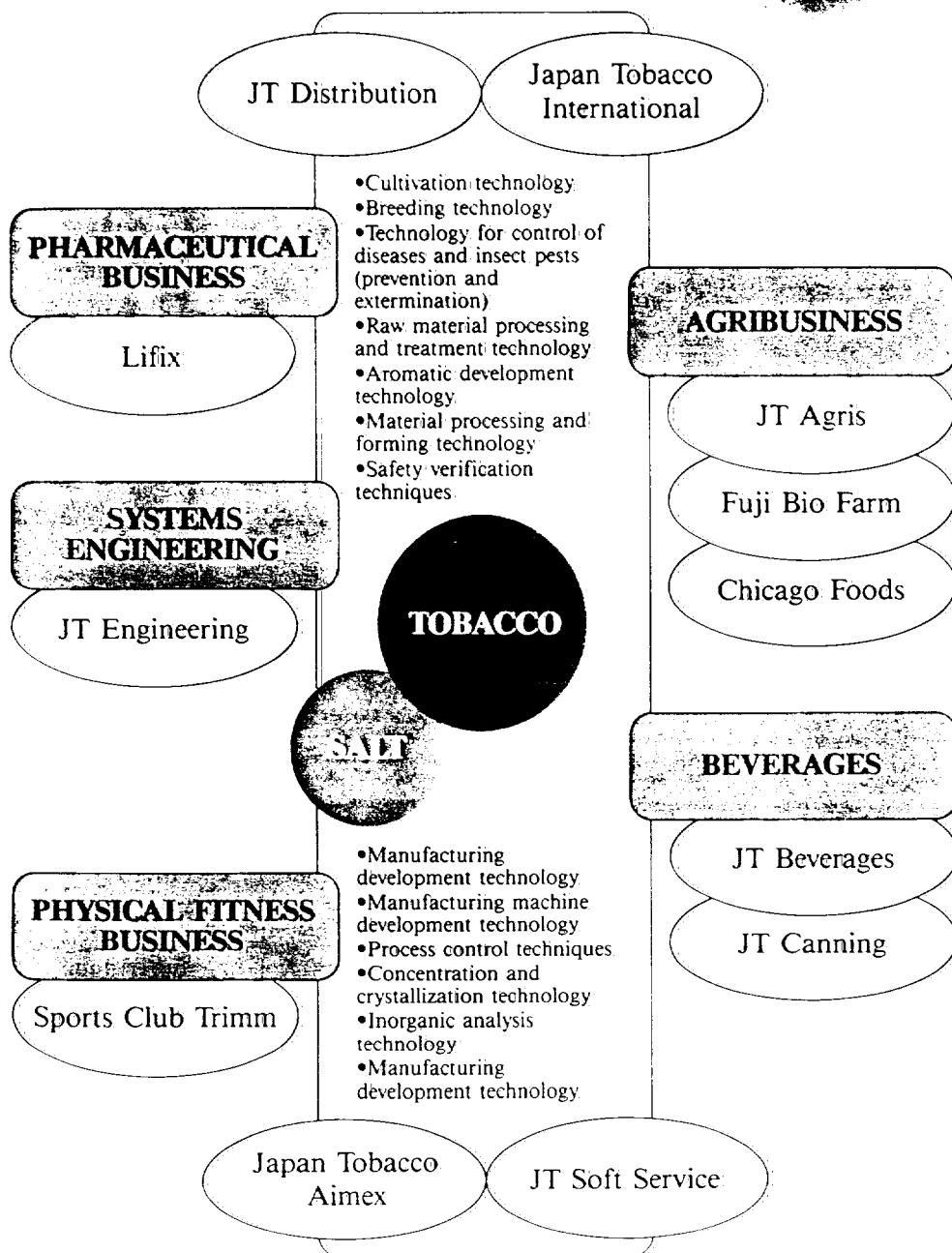
■ Japan Tobacco continued to diversify its activities by establishing new companies, such as Lifix Inc., and by entering into such new business areas as the beverage industry.

HIGHLIGHTS OF THE YEAR

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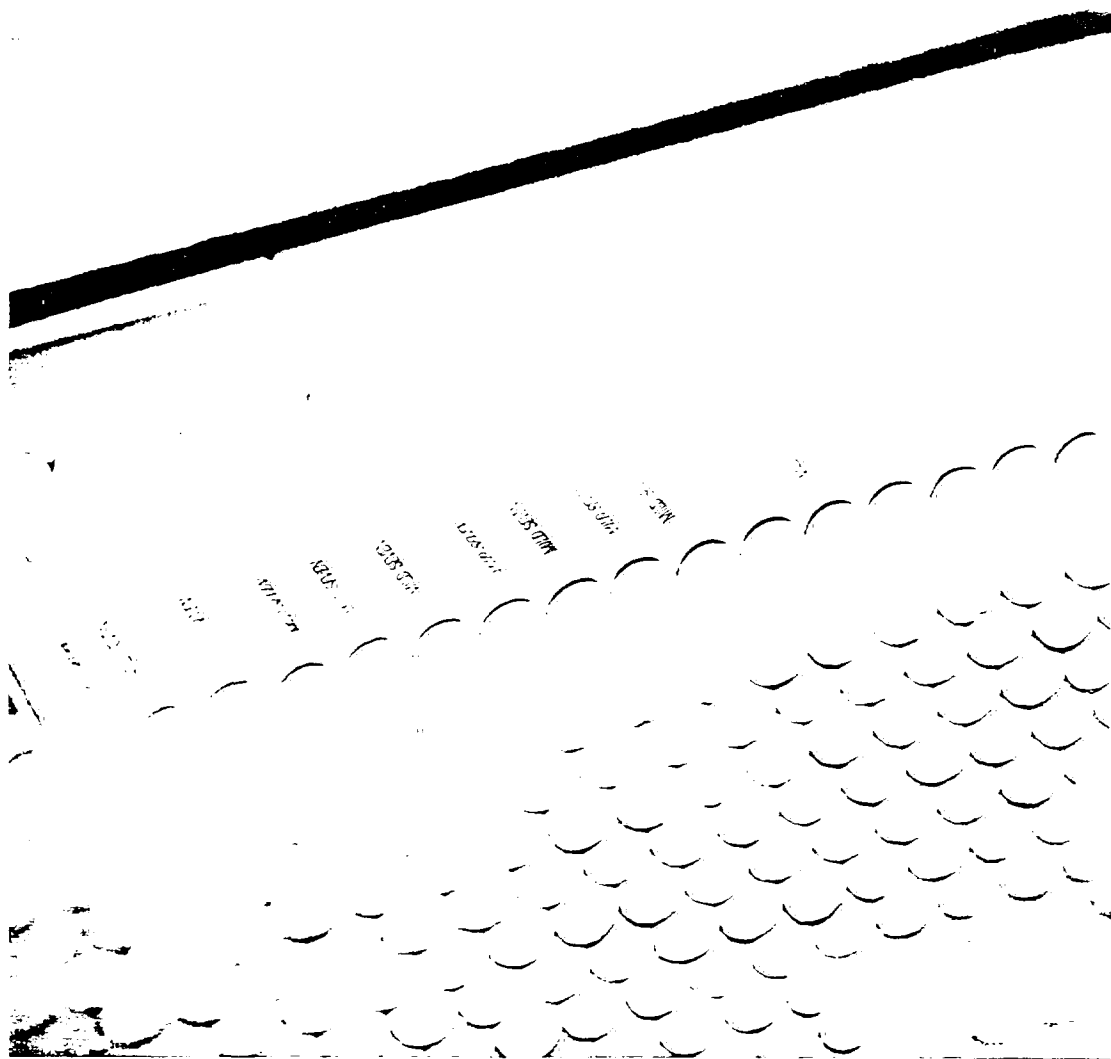
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The MILD SEVEN family, a major Japan Tobacco brand group, accounts for 46.7% of all cigarettes sold by the Company in the domestic market, while MILD SEVEN accounts for 55.0% of all cigarettes exported, indicating its recent growth as a global brand.



JT

TURNING OVER A NEW LEAF

From its early years as Japan Tobacco and Salt Public Corporation, the promotion of brand recognition has been a crucial part of the Company's marketing strategy for tobacco products. For example, one of its earliest cigarette brands, Peace, drew wide attention after the Company engaged an internationally recognized designer to redesign its package. In recent years, we have continued developing and promoting new brands while expanding existing brands for the domestic market. At present, there are more than 70 Japan Tobacco cigarette

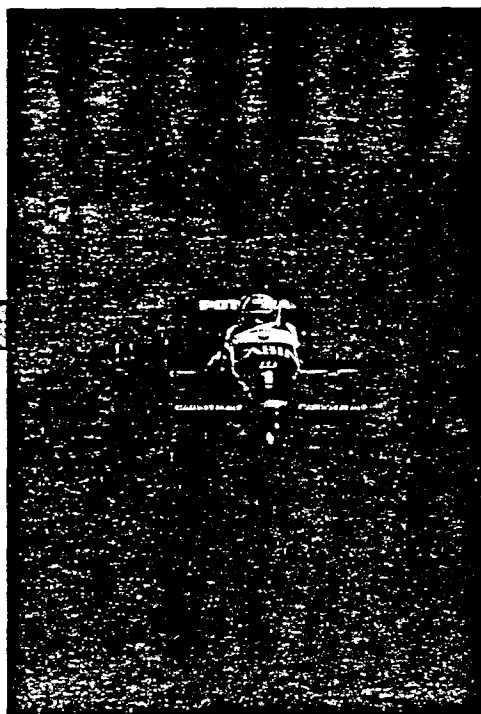
brands on the market, and the Company's main brand, MILD SEVEN, now accounts for 26.0% of the Japanese market for cigarettes. Our other main brands, CASTER and CABIN, are also well known, with the number of smoking devotees increasing every year. These and other leading brand-name products represent one more aspect of our asset wealth.

In recent years, changes in market demand have led Japan Tobacco to review its future strategy. Therefore, we have shifted our energies toward

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"Tsukuba-1" is a new strain of tobacco leaf, developed through a haploid process, that is resistant to a diversity of diseases. Years of accumulated experience in the development of newly improved tobacco strains are being applied in new businesses.



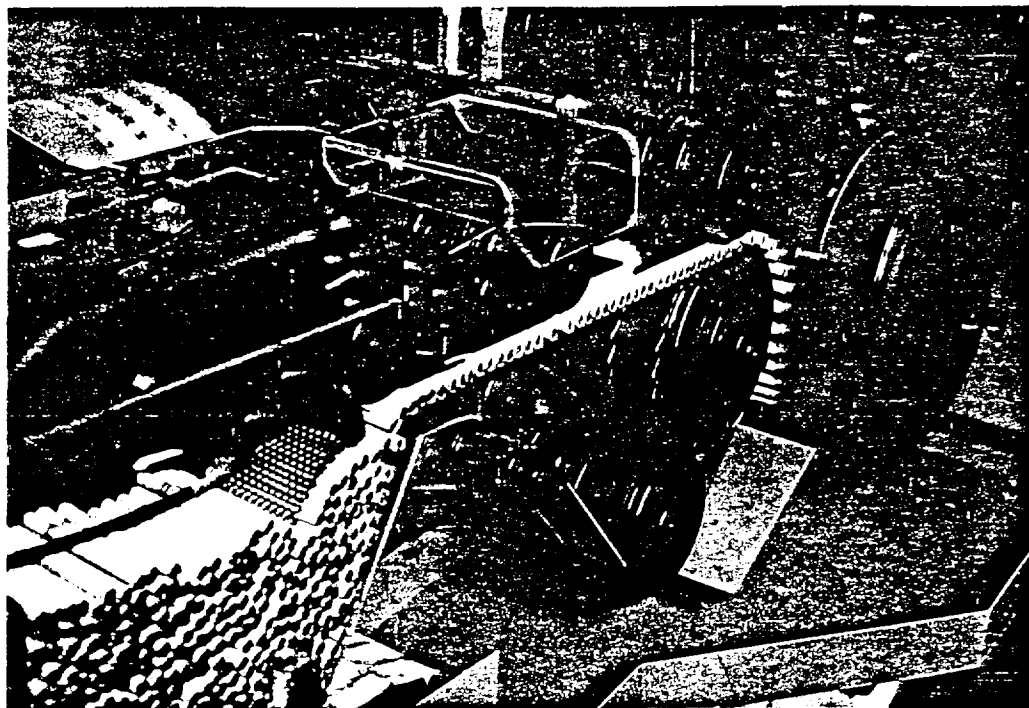
A major presence on racing tracks across the country is the CABIN Racing Team. Japan Tobacco also has a high profile in a wide variety of musical and sports events. These provide entertainment for spectators and work as a powerful marketing tool.

improving our tobacco operations in anticipation of future changes. In addition to our three fundamental policies of lowering costs, increasing efficiency, and developing market-sensitive products, we have begun to focus more on internationalizing our operations as we seek to become a flexible, high-quality, and cost-competitive producer.

Efforts to cut costs include restructuring the domestic leaf tobacco procurement system, introducing the latest and most sophisticated tobacco making and packing equipment available for the

2026230428

The MMDP-8000, developed by the Company, is one of the world's fastest cigarette making machines, capable of producing 8,000 cigarettes a minute.



industry, and improving management efficiency through the usage of computers. While aiming for optimal usage of available personnel, the introduction of the MMDP-8000, one of the world's fastest cigarette making machines developed by Japan Tobacco, will allow the Company to save further on labor costs while increasing product quality. In addition to new large-scale computer network systems linking our plants and offices throughout Japan, an expert system helps us to avoid system crashes for the MMDP-8000.

Further efforts to raise efficiency have

business. In future years, we anticipate that our products will remain favored by the Japanese public, aided by dynamic contributions from our subsidiaries, JT Distribution, Japan Tobacco Aimex (leaf tobacco imports), JT Soft Service, and Japan Tobacco International (JATICO).

JATICO was established in 1984 to handle our international tobacco business. Since the establishment of JATICO, the growth of our international business has been phenomenal. In fiscal 1988, the volume of exports to more than 30 countries increased 82.0%

enabled us to trim inventory levels from the typical one month in 1985 to an average of 0.3 months at present, translating into substantial cost savings.

We are also continuing to improve and reorganize our operational structure to better serve the needs of major cities and urban areas in Japan. As the leading tobacco company in Japan, we are striving to meet the needs of all our customers by keeping a sharp eye on shifting market demands.

Through these measures, we are aiming to turn over a new leaf in our tobacco



Japan Tobacco is continuously introducing the latest, most sophisticated technology into its operations. Through such equipment as advanced computers, we are aiming to further automate the production process and raise the efficiency and speed of production machinery.



Overseas points of operations, such as Hong Kong, provide us with a springboard from which we can penetrate and expand our overseas business while serving as a constant monitor for changes in overseas markets.

over the previous year, and in fiscal 1989, exports rose an additional 62.0%.

MILD SEVEN represented 55.0% of total cigarette exports in fiscal 1989. This clearly indicates that MILD SEVEN is already a global brand.

The Company attributes its success to a growing recognition of its product quality throughout the world. For those markets to which export is nearly

impossible, such as the European Community, local production under license is being used and will continue to be implemented where necessary as a positive alternative to further the successful sale of our products in the future.

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Japan Tobacco's diversification program is a natural expansion springing from its roots in the tobacco industry and from its accumulated resources, such as R&D technological capabilities and real estate. For example, we have established sports clubs by utilizing our real estate resources. In addition, our sales distribution network, incorporating more than 270,000 stores nationwide, provides other opportunities for diversification. At present, while their contributions to total turnover are still minor relative to those from our established tobacco business, we are confident that these new businesses will grow to become additional areas of income support. On the following pages, we will present a short introduction to our business in the pharmaceutical, agribusiness, beverages, and engineering sectors, which represent our main new areas of operations.

Pharmaceuticals

In pharmaceuticals, we have already developed and manufactured a wide range of health-related products in OTC drugs so that people may enjoy healthier and higher-quality lifestyles. At present, our scientists at the Pharmaceutical Research Laboratories and the Toxicology Research Laboratories—where research in pharmac chemistry, biochemistry, pharmacology, pharmaceutical

development, and toxicology is being conducted—are in the process of developing sophisticated and advanced technologies and biotechnologies.

In prescription drugs, research activities involve the development of medicines to treat diseases of the central nervous system, the cardiovascular system, and cancer as the number of older people increases. The Company is aiming to apply the results of these research activities to marketable products as soon as possible through joint research work with various research organizations and pharmaceutical companies in Japan and overseas. In general, long years of research and substantial R&D investments are necessary to develop a new drug. Recently, 10 to 16 years and between ¥8 and ¥10 billion have become the norm for a drug to be developed and marketed. For this reason,



Lifex is aiming for future growth by taking full advantage of Japan Tobacco's extensive sales and distribution network and marketing know-how.

BRANCHING OUT



At the Company's pharmaceutical laboratories, a wide range of innovative research in synthetics, biochemistry, and drug formulations is paving the way for the development of new pharmaceutical products.

it is necessary to have a long-term plan and patience during the research, manufacture, and distribution phases to expand our pharmaceutical business. At present, we are continuing to strengthen our R&D staff, building from the current 130 scientists to reach a total of 400 at the earliest date possible. In two or three years, we are also planning to construct two R&D laboratories. In addition, a pharmaceutical agent is already in the second phase of clinical study, and we are in the process of establishing a manufacturing and sales structure for

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This is a photograph of molecular fusion. Japan Tobacco is already engaged in innovative R&D in biotechnology, which forms the technological basis for its agribusiness. At present, our scientists are concentrating on the development and application of major herbicides and nonpolluting agrochemicals.

this product, with a launch date targeted for 1994.

In April 1988, we established Lifix Inc. in a joint venture with Yoshitomi Pharmaceutical Industries, Ltd., a Japanese pharmaceutical company, to promote diversification into the OTC drug market. Lifix began marketing cold and stomach medicines and fever and cough suppressants in October 1988 and a medicinal drink in August 1988. These products are sold in nearly half of all domestic pharmacies and drugstores. Lifix's health drink, Royal Star, is being

Agribusiness

Agribusiness includes a diversity of integrated operations ranging from the supply of seedlings to foods. This area includes a seed business rooted in the latest biotechnology, plants for the living environment, and foods for an enriched life.

In the agricultural sector, our main objective is to contribute to the farming family through the supply of agricultural materials, such as seeds. Through its expertise accumulated over many years of research in the tobacco business and de-

distributed through our tobacco sales outlets, another example of utilizing our unique and extensive sales network.

In other health-related areas, Japan Tobacco is aiming to build a diversified business by taking a fresh perspective on the emerging and varied needs of its customers. Some examples of the Company's efforts include the supply of hospital food and the creation of "health boutiques," which are facilities incorporating a multitude of services in clinics, sports clubs, and pharmacies.

velopment of new tobacco varieties ahead of other companies in the industry, the Company has succeeded in applying its technologies in such fields as molecular fusion. At present, new types of flowers, vegetables, and cereals and grains are being developed mainly at the Plant Breeding and Genetics Research Laboratory and the Applied Plant Research Laboratory through the application of such technologies as genetic engineering and biotechnology. At the same time, we are aggressively working to develop fertilizers, herbicides, and

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other agricultural products that can be used safely and inexpensively. In addition, we have looked to team up with appropriate partners in Japan and overseas to deepen our knowledge in these areas and broaden the potential applications. Especially through tie-ups with the world-renowned biotechnology companies Plant Genetics Systems and Mycogen, we are endeavoring to develop new plant products and bioherbicides.

In foods, Japan Tobacco is aiming to establish a sound business foundation through offering products with superior nutritional value and taste and by targeting certain parts of the market. Examples include a subsidiary engaged in the mushroom business, Fuji BioFarm Corp., and another in the noodle and processed meat business, JT Agris Corp. These two companies offer specialized foods of distinctive quality. In addition, we established Chicago Foods Corp. in a joint venture with another company in July 1988. In July 1989, we opened our first gourmet hot dog restaurant in Roppongi, Tokyo, an area popular with young people, in our first step into the restaurant business. In addition, to develop various foods businesses that contribute to the establishment of a better diet, we are promoting research in ingredients, processing methods, and recipes at our Food R&D Center while tracking and analyzing prevailing food trends.

Beverages

In beverages, our engineers have used technology accumulated through many years of tobacco production to develop the HalfTime line of canned drinks, which offers our customers a variety of flavors and a distinctly delicate taste. Our knowledge of blending and aromas enabled us to produce aromatic essences closely resembling natural aromas and to use them to flavor beverages. In view of the potential growth the beverage industry has in Japan, we first targeted the canned beverage market, specifically beverages sold in vending machines, as the market with the highest growth potential.

Since our HalfTime product line of canned beverages was released in April 1988, consumer response has exceeded our original expectations. In addition to three prefectures and the Tokyo metropolitan area, we have expanded our sales area to include four prefectures surrounding Nagoya from February 1989. From June 1989, HalfTime will be sold throughout Japan in convenience stores.

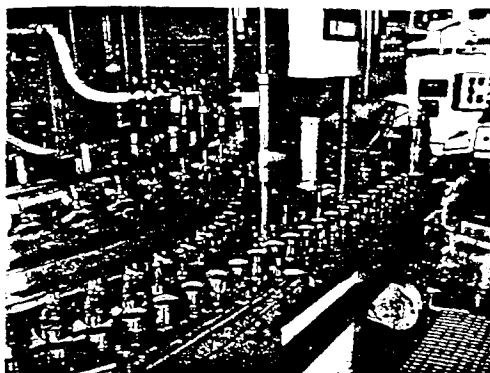
Contributing factors to the popularity of Japan Tobacco's HalfTime product line have been its controlled sweetness aimed at the adult taste preference, its unified container and vending machine design, and the Company's already established strong network of vending machine locations. By making the can design uniform



We offer decorative greenery to beautify the urban home. Customer response has been very favorable for our simple garden sets and a variety of other decorative greenery products.

with that of the vending machine, we are aiming to raise public awareness of HalfTime and set it apart from ordinary canned beverage products. In addition, the strategic placement of HalfTime vending machines next to our tobacco vending machines increases product exposure while facilitating customer access.

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Our HalfTime series of delicately flavored drinks, which was developed through the most advanced technology, is rapidly increasing in popularity.

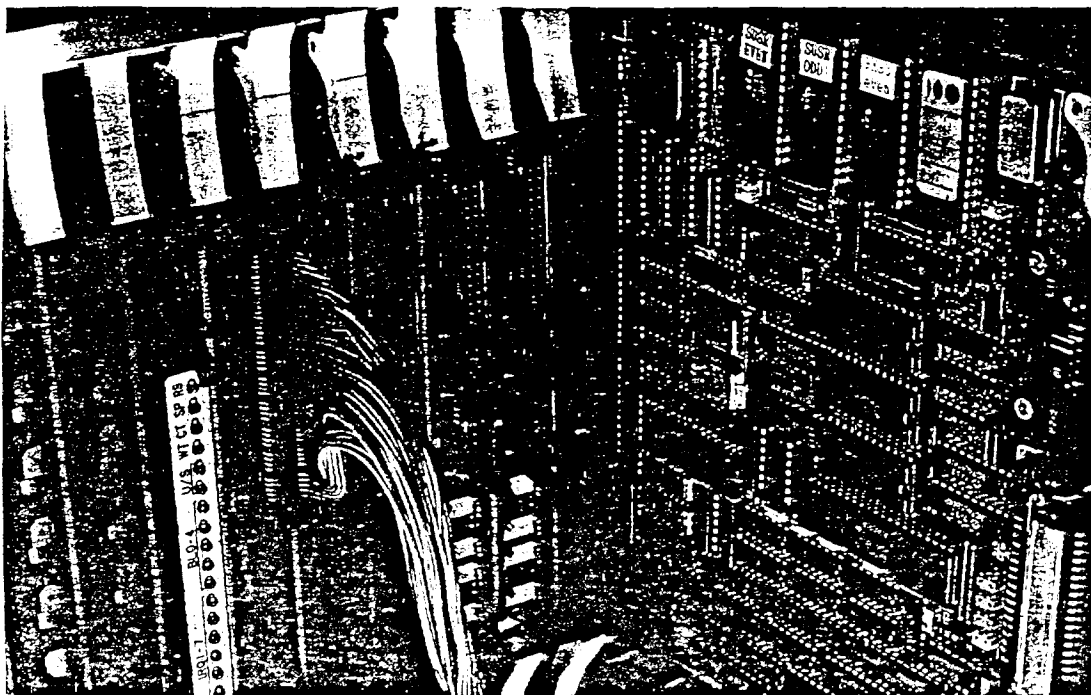
Engineering

During a century of operations in the tobacco business, Japan Tobacco has accumulated extensive know-how in the design and manufacture of machinery used in the tobacco production process. Our technical expertise in quality processing and control, for example, provides a platform from which the Company can venture into new business areas. At our Engineering Research Laboratory, six R&D teams work with such advanced equipment as infrared analyzers, expert systems, and CAD systems to research laboratory automation, factory automation, inorganic materials,

organic materials, information systems, and sensors.

This strong background in machinery technology enables us to offer our clients a diversity of engineering products and services ranging from sensors and high-speed precision machines for other industries to systems engineering for factory automation and laboratory automation, and to design and engineering services for plant construction.

In 1987, we established JT Engineering Inc. (JTE) to provide comprehensive engineering services. JTE assists us in domestic and overseas sales of tobacco product manufacturing equipment and in designing improvements in production at new plants. JTE's operations also include basic equipment design and consulting services. Although the bulk of its business is related to machinery for automated cigarette packaging, JTE also has experience in more than 12 other industries. We expect JTE's expertise in comprehensive engineering services to aid in its expansion not only in the domestic market but in such overseas markets as the Middle East and Southeast Asia.



The Company's engineering services, based on its leading worldwide tobacco production technology, are being actively applied in the tobacco industry and a wide diversity of other business sectors.

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Through more than 85 years of R&D activities in the tobacco industry, Japan Tobacco has kept ahead of new developments and more recently entered into new areas of business. In April 1988, we reorganized our R&D operations to obtain closer links with each operational division. At present, there are research centers at nine locations throughout Japan where specialists in each field work in teams. Of these centers, seven are directly linked to an operational division to facilitate rapid development of marketable products. The remaining two, the Tobacco Science Research Laboratory (TSRL) and the Life Science Research Laboratory (LSRL), are engaged in basic research with a view to developing new business areas for the long term.

Tobacco Science Research Laboratory

TSRL was established to engage in research for the development of innovative tobacco products. By exploring new technologies, this laboratory aims mainly to increase product quality, reduce costs, and develop new products. To develop prototypes for innovative products, TSRL is engaged in the development of new materials that can be used to gear products toward new trends and smoking tastes. Examples of such products include smokeless cigarettes, low-smoke-producing cigarettes, and cigarettes with built-in extinguishing



pleasant, mellow taste through the analysis of leaf tobacco. This involves examination of the composition of various aromas and substances in natural leaf tobacco, the development of liquid carbon dioxide and supercritical fluid

JT

SOWING THE SEEDS OF FUTURE HARVESTS

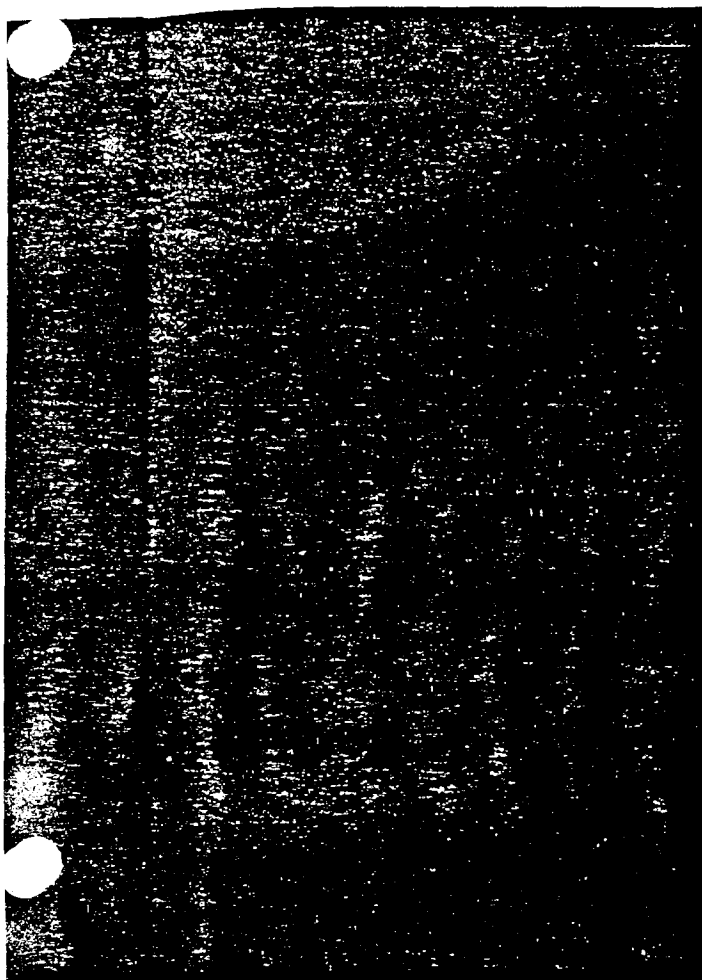
features. To develop these products, TSRL is also engaged in the development of technologies for vulcanization, swelling, and formulation of raw materials. In addition to application research, TSRL is responsible for new technological discoveries that will sow the seeds for basic, general research with a view to the long term.

Research at TSRL is divided into five areas: taste and fragrance, materials, smoke, analysis, and backup systems. In taste and fragrance, for example, TSRL is looking to develop a more

extraction technology, and research into the metabolic functions of microbes through fermentation to find ways to enhance the taste and fragrance of tobacco.

Future success in the tobacco industry lies in this kind of basic, ground-breaking research. Through these research activities, Japan Tobacco, as a leading Japanese company, aims to further contribute to the growth of the tobacco industry and the Japanese economy.

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Nuclear granules and chromosomes (HeLa cell mitotic phase): In analyzing carcinogenesis and cell differentiation mechanisms, the study of cellular and protein structures is very important. We are aiming to understand the functions of protein structures in these two fields.

proteins. In studying insect pheromones, LSRL is attempting to understand how male insects locate female insects through the detection of airborne pheromones, a chemical secreted by female insects.

LSRL has two main objectives in these research activities. The first is to open the door to the technological development of life models, which will enable breakthroughs in each business area. This involves 1) the development of fine chemicals through studies of controls for genetic discoveries and the development of revolutionary catalysts; both of these activities are based on the discoveries of basic, technological breakthroughs concerning life recognition mechanisms; and 2) the application of sensory and recognition research to advanced artificial intelligence robots.

The second main objective of LSRL is to develop potential future business avenues that will sustain our growth into the 21st century and beyond.

Life Science Research Laboratory

LSRL was established to research the recognition and response abilities of life forms using three paradigms: plant viruses, animal cells and proteins, and insect pheromones. In studying plant

viruses, LSRL has focused on RNA, a gene which has the ability to self-replicate. Through these efforts, researchers at LSRL have already succeeded in producing tobacco plants resistant to the cucumber mosaic virus (CMV) by inserting cDNA, a satellite RNA parasitic on CMV, into a tobacco nucleus.

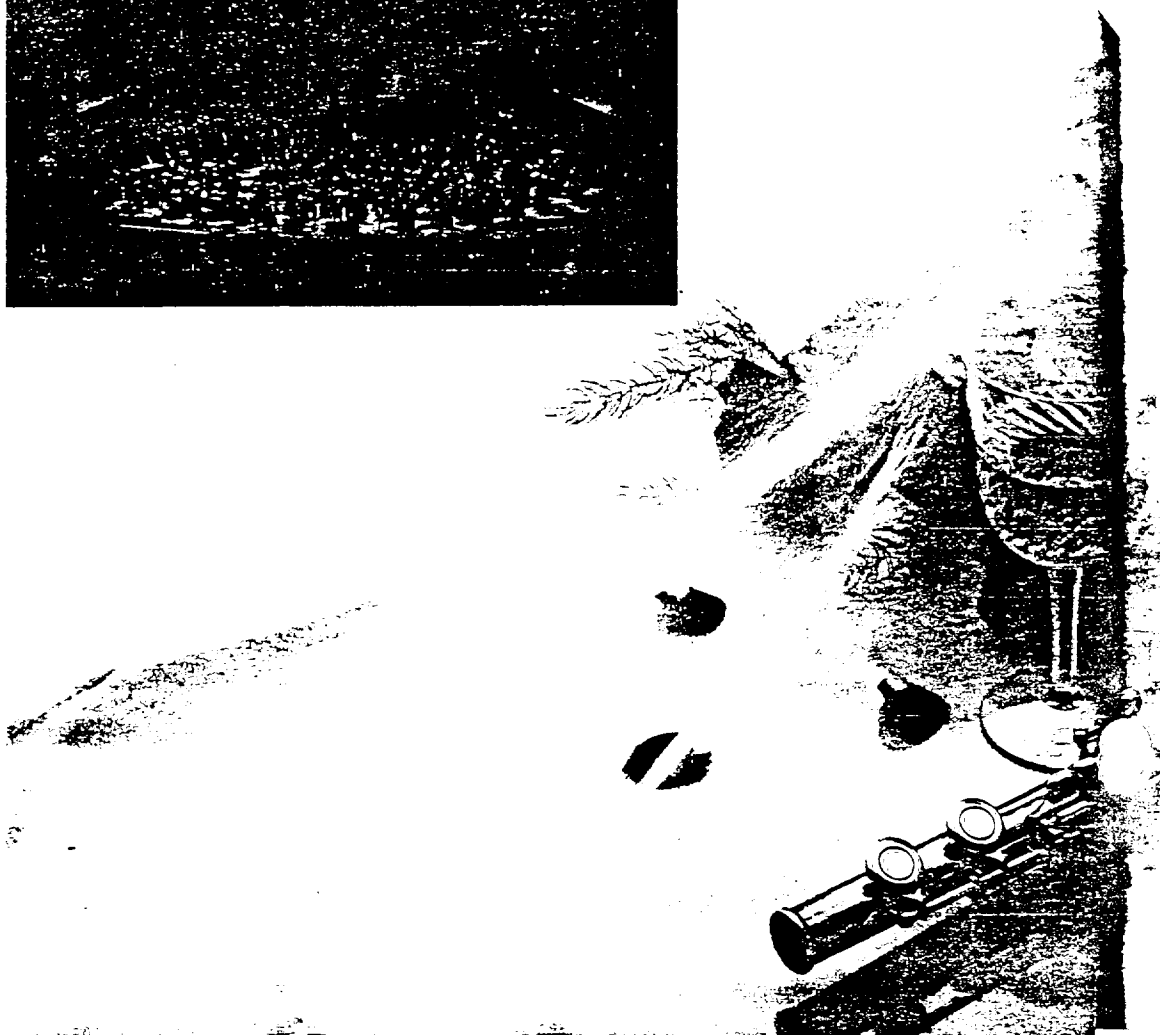
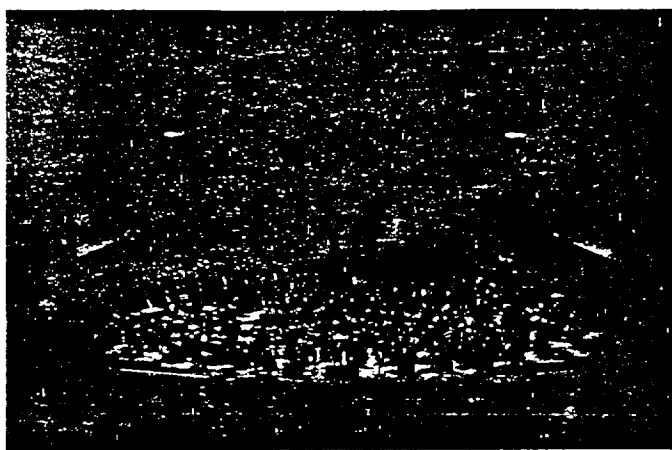
In the area of animal cells and proteins, researchers are studying mechanisms of cell differentiation and carcinogenesis through genetic engineering and X-ray crystallography to understand more about the structure and function of



Rotary evaporator: In search of increased quality, we are working to further expand the range of aromas and tastes, as well as the variety of our tobacco products by researching the natural aromatic particles and physiological activators present in leaf tobacco.

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Through the AFFINIS ARTS
FOUNDATION, Japan
Tobacco supports music
performances. In 1989, the
foundation's activities included
the sponsorship of concerts
and training sessions
for musicians.



HELPING PEOPLE GROW

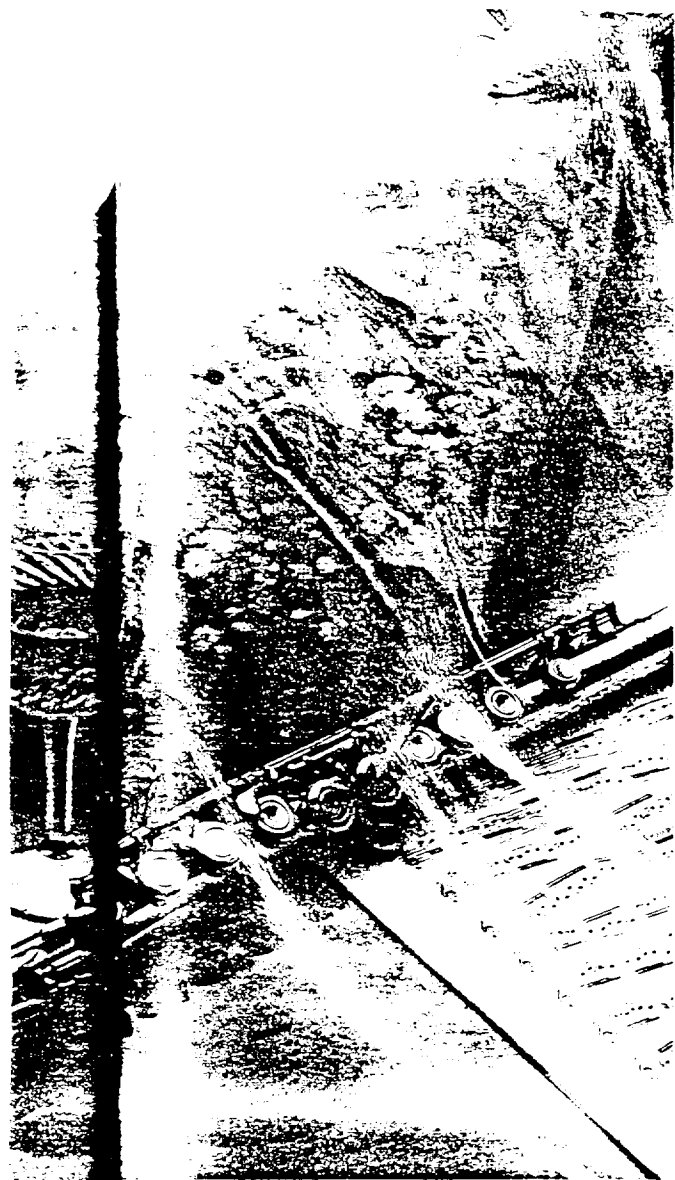
Japan Tobacco's most important corporate objectives are to serve the community and to make the world a better place to live. We have a long history of serving the public through the promotion of cultural activities and environmental campaigns, among other programs.

The Tobacco and Salt Museum, located in central Tokyo, first opened its doors to the public in 1978. Since then, many visitors have learned about the history and important uses of tobacco and salt in our lives through exhibits, mini-lectures, and field trips. This unique

museum has more than 22,000 items on permanent display through which the public can visualize the history of tobacco and salt. In addition, several special exhibits are held annually, covering topics of interest for the public.

Another method of fulfilling our responsibilities as a corporate citizen has been our "Smokin' Clean" campaign. Since 1963, we have endeavored to inform the Japanese public about the importance of keeping our living environment clean, and we have cooperated with fire safety officials to keep the

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sponsorship for concerts and other artistic activities as well as endowments for the training of performing artists. This foundation is one of the largest devoted to the musical arts in Japan.

In addition, Japan Tobacco is active in sponsoring various cultural and sports programs, including jazz festivals, motor races, a World Cup for sailing, classical music concerts, and monthly talk shows.



Our Tobacco and Salt Museum, a unique museum incorporating the history and culture of the salt and tobacco industries, is widely known and highly regarded in Japan.



At the Company's "Salt Experimental Classroom," which is held in major cities throughout Japan every summer, children experience the "mystery and fun" of salt.

public aware of the fire hazards associated with careless smoking. From early on, we installed ashtray stands in parks and other public facilities and gave away free portable ashtrays to prevent smokers from littering streets with cigarette butts. More recently, we have begun to emphasize such smoking etiquette as showing greater consideration for non-smokers.

In 1988, we established the AFFINIS ARTS FOUNDATION, our most ambitious plan so far to promote activities in the field of music. The objectives of this foundation include providing



Japan Tobacco has promoted its "Smokin' Clean" campaign for over 20 years. As a member of the corporate community, we will continue promoting courtesy among the smoking public.

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Kazuo Iwata



Shigeru Mizuno



Yasushi Endo



Kinya Katsukawa

JT

DIRECTORS AND OFFICERS

Chairman of the Board

Kazuo Iwata

President and Chief Executive Officer

Shigeru Mizuno

Senior Executive Vice Presidents

Yasushi Endo

Kinya Katsukawa

Executive Vice Presidents

Tsutomu Kamiwaki
Manufacturing, Machinery, Enterprise

Tomoyuki Sato
Leaf Tobacco

Executive Directors:

Kiyotane Edayoshi
Salt Administration

Yutaka Wakushima
Marketing

Hideo Murayama
Pharmaceutical Business

Tatsuro Suzuki
Business Development and Affiliated Business; Beverage; Real Estate; Physical Distribution; Internal Audit

Kunio Kato
Fundamental Research, System Engineering

Jiro Sekiguchi
Public Relations, Personnel

Kazuya Ninomi
Domestic Leaf Tobacco

Corporate Counselor, Director

Tadayukii Ishii

Managing Directors

Hitoshi Oki
Kanto Regional Sales Headquarters

Hiroshi Goto
Planning, Finance, General Administration

Toshio Kikuma
Labor Relations

Nobuhiko Sagawa
Kansai Regional Sales Headquarters

Yukiteru Obi
General Manager of Applied Plant Research Laboratory

Tsutomu Eguchi
Manufacturing Information System

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Tsutomu Kamiwaki



Tomoyuki Sato



Kiyotane Edayoshi



Yutaka Wakushima



Hideo Murayama



Tatsuro Suzuki



Kunio Kato



Jiro Sekiguchi



Kazuya Niinomi

Yasuhiko Olee

Agribusiness

Ryuichi Yamada

Chubu Regional Sales Headquarters

Standing Auditors

Daisuke Ishibashi

Kazuo Ishii

Vice Presidents

Katsuhiko Honda

Planning

Nobumaro Kawashima

Technological Planning

Ryusuke Itoi

Information System

Keiji Takemoto

General Administration

Akio Niitsu

Public Relations

Makoto Ebara

Personnel

Susumu Yamaguchi

Real Estate

Yasuhiko Kato

Finance

Hideo Yamada

Physical Distribution

Takashi Ozaki

Internal Audit

Shigeru Ichinose

Business Development & Affiliated Business

Masayoshi Sato

Agribusiness

Masamichi Nishimoto

Pharmaceutical Business

Takashi Okada

System Engineering

Morihiko Sometani

Marketing

Seiichi Murakami

Product Planning

Hiroshi Yoshimura

Machinery Enterprise

Tamotsu Uchida

Mechanical Enterprise

Yasumasa Ito

Printing Enterprise

Hideyuki Yanaka

Purchasing

Yoichi Kitada

Overseas Leaf Tobacco

Tetsuro Tamura

Salt Administration

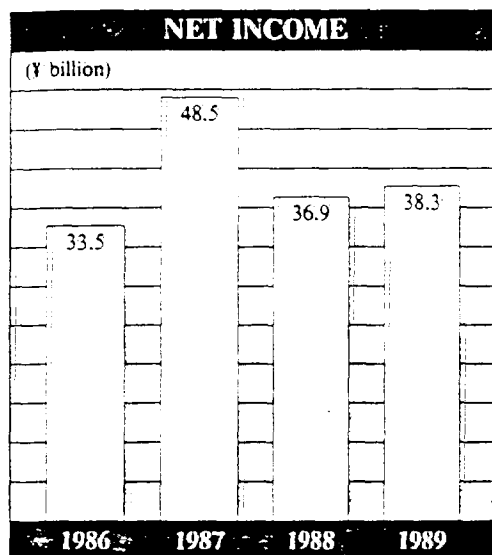
(As of June 28, 1989)

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**REPORT OF INDEPENDENT CERTIFIED
PUBLIC ACCOUNTANTS**

20



taking appropriate steps to meet present and possible future trends.

During fiscal 1989, the Company's best-selling tobacco brand, MILD SEVEN, continued to be the brand most favored by the Japanese public, with a 26.0% market share. The second most popular brand, MILD SEVEN Lights, had an estimated 14.7% market share. To maintain and further reinforce its image and dominant market position, the Company continued its program of carefully planned advertising and introduction of new products. New products introduced in the year under review include additions to the MILD SEVEN and CASTER families, MILD SEVEN FK, and CASTER MILD, in response to continued customer loyalty for these brands. In addition, SomeTime MIASS, an upmarket version of

the SomeTime LIGHT; Frontier, a super-low nicotine tar product; and CABIN 85 MILD Box, a hard-boxed package of CABIN 85 MILD, were introduced to customers. In addition, tobacco exports increased 62.0% in volume, to 4.3 billion cigarettes, due to sustained promotion of the Company's products in overseas markets by its subsidiary JATICO.

In fiscal 1989, the Company continued its diversification program by launching its beverage line, HalfTime; establishing JT Beverages to take charge of vending machine and other operations; and establishing Sports Club Trimm to promote health-related sports activities. On the international front, the production and export of vending machines and tobacco production machinery activities were continued. Other subsidiaries established in the year under review include Lifix, a joint venture company with a prominent Japanese pharmaceuticals company, and three other joint venture companies for the production and design of machinery and office equipment—JT CMK, JTS Denso, and JT Okamura. These three companies were all established with already available resources held by Japan Tobacco and represent another method of optimizing Company resources.

Since the Company's new business areas in agribusiness, pharmaceuticals, and engineering still represent only a tiny fraction of net sales, earnings contributions from these activities are shown together with tobacco sales in the Tobacco Business Division. While earnings contributions from new business areas remain insignificant relative to the Company's core business in tobacco, Japan Tobacco will continue its policy of dividing net sales into

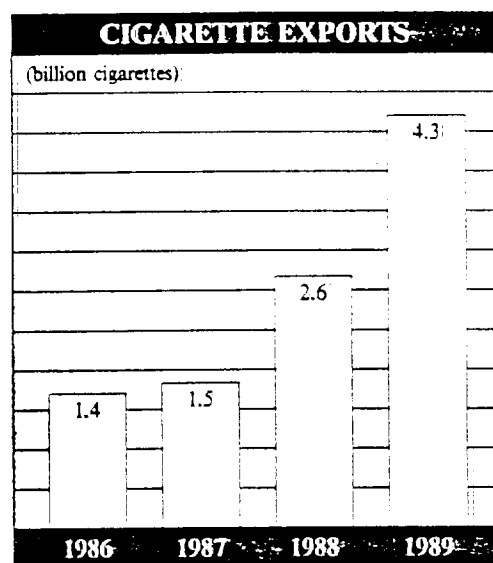
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its Tobacco Business Division or its Salt Business Division. However, the Company has been extremely pleased with the substantial growth many of its new business activities have shown in the year under review.

As a result of new brand introductions, increasing contributions from new operations, and vigorous promotional campaigns, total sales for the Tobacco Business Division in value only decreased 2.7%, to ¥2,654 billion, while tobacco sales volume decreased 3.2% from fiscal 1988, to 269.2 billion cigarettes, despite intense competition from foreign brands.

Lower national and regional taxes stemming from a decrease in tobacco sales volume contributed to lower cost of goods sold. In addition, the Company's efforts to rationalize production through the introduction of sophisticated equipment at its plants contributed to a 3.7% decline in cost of goods sold, to ¥88.2 billion, compared to fiscal 1988. However, substantial increases in promotional activities resulted in a 5.9% increase in selling, general and administrative expenses. This resulted in a 1.4% increase in operating profits, to ¥91.1 billion.

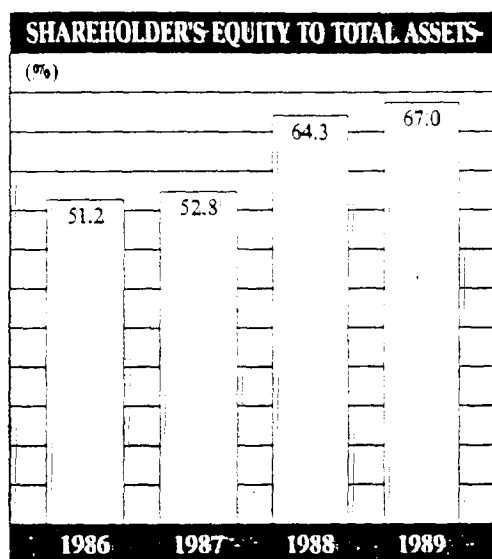
At the non-operating level, while income decreased ¥3.6 billion due to reduced interest income, expenses increased ¥550 million despite a decline in interest payments of ¥1.5 billion. This increase was mainly due to a rise of ¥2.9 billion in aid to leaf tobacco producers suffering from the negative effects of natural disasters. The result was a decrease of 3.0% in recurring profits, to ¥91.5 billion. Extraordinary losses of ¥19.6 billion stemming from a one-time payment to the Japan Leaf Tobacco Adjustment Fund resulted in a



further decline in pre-tax income. However, with lower corporate and regional taxes, net income from tobacco operations increased 13.3%, to ¥31.3 billion.

Salt Business Division

In its role as the sole supplier of salt in Japan, the Company continued to ensure stability in supply and prices throughout fiscal 1989 while working to steer its salt business toward future independent operations as directed in January 1987 by the Salt Provisional Committee. Salt sales for common use remained unchanged from fiscal 1988, at 1.2 million tons, while sales from salt supplied to the caustic soda industry increased 6.6%, to 70.8 million tons, as industrial activity remained strong. However, due to a domestic salt price cut from fiscal 1987, total salt sales decreased



1.1% in value from fiscal 1988, to ¥69.9 billion. A change in some aspects of the salt procurement system resulted in a rise in cost of goods sold. Selling, general and administrative expenses also increased 3.0% with the contribution of ¥1.5 billion to the Salt Science Foundation, resulting in a 37.1% decrease in operating income, to ¥4.5 billion. Net income of ¥7.1 billion was deposited in the reserve for salt monopoly price stabilization in accordance with the Monopoly in Salt Act.

Company Financial Position

Total assets decreased 1.1% compared to the previous year, to ¥1,501.5 billion. Inventories of leaf tobacco, which comprise over half of total assets, continued to be reduced during the year. As a result of a decline in purchase prices and reduced inventory levels, leaf

tobacco stock decreased 9.9% compared to the previous year, to ¥700.4 billion. Shareholder's equity, which is composed mainly of net income, increased ¥30.3 billion. However, because capital expenditures were nearly equivalent to depreciation expenses, the increased amount was placed in time deposits and marketable securities for fund management. This increased short-term investments, mainly time deposits and certificates of deposit, 54.6% compared to the previous year, to ¥141.3 billion. Current assets, which includes accounts receivable, decreased 2.1%, to ¥1,021.7 billion. Because capital investment was held at last year's level, property, plant and equipment did not increase significantly in the year under review; however, investments and other assets showed a slight increase.

Due to reduced corporate taxes, deferred taxes decreased ¥40.7 billion, and this contributed to the decline of ¥36.9 billion in current liabilities. There were no significant changes in non-current liabilities.

As a result of these factors, working capital increased ¥15.1 billion, and the liquidity ratio increased from 3.17 to 3.50. Shareholder's equity to total assets, reflecting increased retained earnings, continued to increase, rising from 64.3% to 67.0%. Net sales to total assets showed a minimal decrease from 1.84 to 1.81. As net income registered a moderate gain, total assets fell slightly.

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NON-CONSOLIDATED BALANCE SHEETS

Japan Tobacco Inc.
Years ended March 31, 1988 and 1989

| | Millions of yen | | Millions of U.S. dollars (Note 3) |
|---|-----------------|------------|---|
| | 1988 | 1989 | 1989 |
| ASSETS | | | |
| Current assets: | | | |
| Cash | ¥ 75,661 | ¥ 80,454 | \$ 610 |
| Short-term investments, mainly time deposits and certificates of deposit | 91,365 | 141,286 | 1,070 |
| Trade notes and accounts receivable | 12,117 | 14,397 | 109 |
| Inventories (Notes 4 and 6) | 854,148 | 769,235 | 5,828 |
| Other current assets | 10,185 | 16,309 | 123 |
| Total current assets | 1,043,476 | 1,021,681 | 7,740 |
| Property, plant and equipment: | | | |
| Land | 106,297 | 107,489 | 815 |
| Buildings and structures | 378,155 | 387,844 | 2,938 |
| Machinery and equipment | 318,275 | 322,096 | 2,440 |
| Vehicles and tools | 26,049 | 30,755 | 233 |
| Construction in progress | 6,381 | 2,934 | 22 |
| | 835,157 | 851,118 | 6,448 |
| Less accumulated depreciation | 413,972 | 430,031 | 3,258 |
| | 421,185 | 421,087 | 3,190 |
| Investments and other assets: | | | |
| Investments in subsidiaries and associated companies | 5,235 | 8,498 | 64 |
| Investment securities | 22,975 | 26,095 | 198 |
| Other assets | 25,173 | 24,105 | 183 |
| | 53,383 | 58,698 | 445 |
| | ¥1,518,044 | ¥1,501,466 | \$11,375 |

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| | Millions of yen | | Millions of U.S. dollars (Note 3) |
|--|-----------------|------------|---|
| | 1988 | 1989 | 1989 |
| LIABILITIES AND SHAREHOLDER'S EQUITY | | | |
| Current liabilities: | | | |
| Short-term bank loans (Note 7) | ¥ 56,000 | ¥ 61,000 | \$ 462 |
| Current portion of long-term debt (Note 7) | 140 | 228 | 2 |
| Excise taxes payable (Note 8) | 158,352 | 150,097 | 1,137 |
| Trade payables | 46,847 | 52,311 | 396 |
| Income taxes payable (Note 8) | 55,757 | 15,042 | 114 |
| Accrued employee bonuses | 10,245 | 9,417 | 71 |
| Other current liabilities | 1,558 | 3,917 | 30 |
| Total current liabilities | 328,899 | 292,012 | 2,212 |
| Non-current liabilities: | | | |
| Long-term debt (Note 7) | 16,374 | 16,632 | 126 |
| Liability for severance payments | 189,294 | 185,579 | 1,406 |
| Other non-current liabilities | 7,293 | 800 | 6 |
| | 212,961 | 203,011 | 1,538 |
| Commitments and contingencies (Note 12) | | | |
| Shareholder's equity (Notes 9 and 13): | | | |
| Common stock, ¥50,000 par value; | | | |
| Authorized—8,000,000 shares | | | |
| Issued and outstanding—2,000,000 shares | 100,000 | 100,000 | 758 |
| Capital fund of salt monopoly business | 25,683 | 25,683 | 195 |
| Additional paid-in capital | 736,400 | 736,400 | 5,579 |
| Legal reserve | 1,600 | 2,400 | 18 |
| Reserve for salt monopoly price stabilization | 39,690 | 46,750 | 354 |
| Retained earnings | 72,811 | 95,210 | 721 |
| Total shareholder's equity | 976,184 | 1,006,443 | 7,625 |
| | ¥1,518,044 | ¥1,501,466 | \$11,375 |

See notes to non-consolidated financial statements.

2026230446

NON-CONSOLIDATED STATEMENTS OF INCOME

Japan Tobacco Inc.
Years ended March 31, 1988 and 1989

| | Millions of yen | | Millions of U.S. dollars (Note 3) |
|---|------------------|------------------|---|
| | 1988 | 1989 | 1989 |
| Net sales | ¥2,797,856 | ¥2,723,962 | \$20,636 |
| Cost of sales: | | | |
| Cost of products sold | 659,892 | 630,201 | 4,774 |
| Excise taxes on products sold (Note 8) | 1,793,452 | 1,735,411 | 13,147 |
| | <u>2,453,344</u> | <u>2,365,612</u> | <u>17,921</u> |
| Gross profit | 344,512 | 358,350 | 2,715 |
| Selling, general and administrative expenses | <u>230,457</u> | <u>253,461</u> | <u>1,920</u> |
| Operating profit | 114,055 | 104,889 | 795 |
| Other income (expenses): | | | |
| Interest income, net | 6,201 | 6,470 | 48 |
| Loss on disposals of property, plant and equipment | (475) | (3,479) | (26) |
| Other, net (Note 11) | <u>2,407</u> | <u>(23,012)</u> | <u>(174)</u> |
| | <u>8,133</u> | <u>(20,021)</u> | <u>(152)</u> |
| Income before income taxes | 122,188 | 84,868 | 643 |
| Income taxes (Note 8) | <u>85,299</u> | <u>46,540</u> | <u>353</u> |
| Net income | <u>¥ 36,889</u> | <u>¥ 38,328</u> | <u>\$ 290</u> |

See notes to non-consolidated financial statements.

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NON-CONSOLIDATED STATEMENTS OF SHAREHOLDER'S EQUITY

Japan Tobacco Inc.
Years ended March 31, 1988 and 1989

| | Millions of yen | | Millions of U.S. dollars (Note 3) |
|---|-----------------|-----------------|---|
| | 1988 | 1989 | 1989 |
| Common stock | <u>¥100,000</u> | <u>¥100,000</u> | <u>\$ 758</u> |
| Additional paid-in capital | <u>¥736,400</u> | <u>¥736,400</u> | <u>\$5,579</u> |
| Legal reserve: | | | |
| Balance at beginning of year | ¥ 800 | ¥ 1,600 | \$ 12 |
| Add: | | | |
| Transfer from retained earnings | 800 | 800 | 6 |
| Balance at end of year | <u>¥ 1,600</u> | <u>¥ 2,400</u> | <u>\$ 18</u> |
| Capital funds of salt monopoly business | <u>¥ 25,683</u> | <u>¥ 25,683</u> | <u>\$ 195</u> |
| Reserve for salt monopoly price stabilization: | | | |
| Balance at beginning of year | ¥ 30,407 | ¥ 39,690 | \$ 301 |
| Add: | | | |
| Transfer from retained earnings | 9,283 | 7,060 | 53 |
| Balance at end of year | <u>¥ 39,690</u> | <u>¥ 46,750</u> | <u>\$ 354</u> |
| Retained earnings: | | | |
| Balance at beginning of year | ¥ 54,050 | ¥ 72,811 | \$ 552 |
| Add: | | | |
| Net income | 36,889 | 38,328 | 290 |
| Deduct: | | | |
| Cash dividends, ¥4,000 per share | (8,000) | (8,000) | (61) |
| Bonuses to directors and statutory auditors | (45) | (69) | (1) |
| Transfer to legal reserve | (800) | (800) | (6) |
| Transfer to reserve for salt monopoly price stabilization | (9,283) | (7,060) | (53) |
| Balance at end of year | <u>¥ 72,811</u> | <u>¥ 95,210</u> | <u>\$ 721</u> |

See notes to non-consolidated financial statements.

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NOTES TO NON-CONSOLIDATED FINANCIAL STATEMENTS

Japan Tobacco Inc.
Years ended March 31, 1988 and 1989.

1. Organization and business

Japan Tobacco Inc. (the Company) was incorporated on April 1, 1985 as an ordinary business company, pursuant to the Nihon Tabako Sangyo Kabushiki Kaisha Law (the Law) enacted upon the resolution of the Japanese Diet.

Japan Tobacco and Salt Public Corporation (the Public Corporation), the predecessor of the Company, which had conducted tobacco and salt operations, was dissolved on the date of the Company's incorporation.

Upon incorporation, the Company, with the assets and liabilities of the Public Corporation, began the same operations as the Public Corporation, and is expanding its business in accordance with the diversification program connected with agribusiness, pharmaceuticals, engineering and real estate with the approval of the Japanese government. However, as the Monopoly in Salt Act (the Monopoly Act) is still effective, the salt operations, which are conducted in order to provide the nation with salt at a reasonable price and strengthen the foundations of the domestic salt industry, are regarded as a designation from the Government. Accordingly, the salt operations are not subject to the shareholder's rights and are basically exempt from income taxes.

As a result, the Company's assets and liabilities and the results of its operations should be separately accounted for between the profit-oriented operations represented by the tobacco business, and the salt operations.

Pursuant to the Law, the Government should keep more than one-half of the shares of the Company (two-thirds of the shares for the provisional term by the supplementary provisions of the Law); at present, all of the shares are held by the Government.

Considering the circumstances surrounding the Company described above, the Law and the Monopoly Act require that approval and authorization be obtained from the Minister of Finance regarding fundamentals such as: (1) the issuance of new shares and convertible debentures, (2) amendments to the Articles of Incorporation, (3) operating plan and (4) appropriations of earnings for the profit-oriented operations; and for the salt

operations: (1) operations plans, (2) budget, (3) plan of cash position, (4) borrowing of long-term loans and (5) financial statements.

2. Basis of presenting financial statements

The non-consolidated financial statements have been prepared in accordance with the provisions set forth in the Japanese Commercial Code and the related accounting regulations and the Monopoly Act, and in conformity with generally accepted accounting principles and practices in Japan. Under the Japanese Commercial Code, the Company is not required to prepare consolidated financial statements.

In preparing the non-consolidated financial statements, certain reclassifications and rearrangements have been made in the financial statements issued domestically in Japan in order to present these statements in a form which is more familiar to readers outside Japan. In addition, certain note information which is not required under generally accepted accounting principles and practices in Japan is presented herein as additional information.

3. Summary of significant accounting policies

a) Securities

Quoted marketable and investment securities are stated at the lower of cost or market, cost being determined on the moving average method. Other securities are stated at the moving average method.

b) Inventories

Profit-oriented operations:

Inventories mainly consisting of leaf tobacco are stated substantially at the average method.

In accordance with generally recognized practices, leaf tobacco is classified as current assets, although part of such inventories, due to the duration of the aging process, ordinarily will not be sold within one year.

Salt operations:

Inventories in salt operations are stated at the average method.

c) Property, plant and equipment

Property, plant and equipment are carried at cost. Depreciation is computed on the declining-balance method over the estimated useful lives of assets stipulated by the Japanese Corporate Tax Law. The useful lives of major assets are substantially 50 years for buildings and 8 years for tobacco producing machinery.

d) Investments in subsidiaries and associated companies

Investments in subsidiaries and associated companies (ownership: 20% to 50%) are stated at cost.

e) Income taxes

Income taxes are provided for amounts currently payable for each year. Deferred income taxes pertaining to timing differences in the recognition of certain income and expenses between financial and tax reporting are not recognized.

f) Retirement benefits

Under most circumstances, employees of the Company terminating their employment are entitled to lump-sum payments based on the rate of pay at the time of termination, years of service and certain other factors. The Company provides for retirement benefits to state the amount which would be required if all employees voluntarily terminated their employment at each balance sheet date. Provisions for retirement benefits include those for directors and statutory auditors of the Company. Such provisions are not funded.

g) Research and development expenses

Research and development expenses are charged to income as incurred.

h) U.S. dollar amounts

Amounts in U.S. dollars are included solely for the convenience of readers. The rate of ¥132=U.S.\$1, the approximate rate of exchange at March 31, 1989, has been used. The inclusion of such amounts is not

intended to imply that Japanese yen have been, could have been, or could be readily converted, realized or settled in U.S. dollars at that or any other rate.

4. Accounting change

Effective April 1, 1988, in order to meet the declining tendency of the purchase price, the Company changed its method of valuing leaf tobacco from the last-in, first-out method to the average method. This change had the effect of reducing inventories and income before income taxes by ¥20,936 million (\$159 million).

5. Transactions with subsidiaries

The transactions with and due from/(to) subsidiaries were as follows:

Transactions:

| | Millions of yen | | Millions of U.S. dollars |
|-----------|-----------------|----------|--------------------------|
| | 1988 | 1989 | 1989 |
| Sales | ¥ 4,768 | ¥ 10,750 | \$ 81 |
| Purchases | 42,769 | 101,262 | 767 |

Due from/(to):

| | | | |
|-------------|---------|----------|-------|
| Receivables | ¥ 7,435 | ¥ 6,816 | \$ 52 |
| Payables | (5,717) | (13,846) | (105) |

6. Inventories

Inventories at March 31, 1988 and 1989 comprise the following:

| | Millions of yen | | Millions of U.S. dollars |
|------------------------------------|-----------------|----------|--------------------------|
| | 1988 | 1989 | 1989 |
| Profit-oriented operations: | | | |
| Leaf tobacco | ¥777,200 | ¥704,728 | \$5,339 |
| Finished products | 52,436 | 44,401 | 337 |
| Other | 20,955 | 17,043 | 129 |
| | 850,591 | 766,172 | 5,805 |
| Salt operations: | | | |
| | 3,557 | 3,063 | 23 |
| Total | ¥854,148 | ¥769,235 | \$5,828 |

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7. Short-term bank loans and long-term debt

Short-term bank loans of ¥61,000 million are represented by 90-180 day notes bearing interest at the rate of 3.375% per annum and are not secured.

Long-term debt comprised the following:

| | Millions of yen | | Millions of U.S. dollars |
|---|-----------------|----------------|--------------------------|
| | 1988 | 1989 | 1989 |
| 5% Swiss franc bonds due 1994 | ¥14,305 | ¥14,305 | \$108 |
| 4.4% to 5.3% unsecured loans from banks due 1993-1996 | 2,005 | 2,177 | 17 |
| Unsecured loans from Bio-Oriented Technology Research Advancement Institution | 204 | 378 | 3 |
| | 16,514 | 16,860 | 128 |
| Less current portion | 140 | 228 | 2 |
| | <u>¥16,374</u> | <u>¥16,632</u> | <u>\$126</u> |

The obligations created by the bonds are secured by a statutory preferential right, according to the Law, over the whole property of the Company. Unsecured loans from the Bio-Oriented Technology Research Advancement Institution are repayable from March 1992 through September 2001 with interest at the weighted average rate of 4.75% per annum.

8. Income taxes and excise taxes

The Company is subject to a corporate tax, inhabitants taxes and enterprise taxes based upon income from the profit-oriented operations, which in the aggregate, resulted in a normal statutory rate of approximately 56%.

The salt operations are exempt from income taxes with certain exceptions. The effective tax rates in the statements of income differ from the normal statutory rate, primarily because of the effect of timing differences, the effect of permanently non-deductible expenses, the lower tax rate applied to the portion of income distributed as dividends, tax credit for research and development expenditures, and the tax exemption of the salt operations.

The Company is also subject to national and local excise taxes, comprised of an ad valorem duty and a specific duty, on the tobacco products.

Excise taxes included in the cost of sales for the years ended March 31, 1988 and 1989 were as follows:

| | Millions of yen | | Millions of U.S. dollars |
|----------|-------------------|-------------------|--------------------------|
| | 1988 | 1989 | 1989 |
| National | ¥ 901,375 | ¥ 872,467 | \$ 6,610 |
| Local | 892,077 | 862,944 | 6,537 |
| | <u>¥1,793,452</u> | <u>¥1,735,411</u> | <u>\$13,147</u> |

9. Shareholder's equity

Shareholder's equity items of the Company comprised those of the profit-oriented operations and those of the salt operations in accordance with the Japanese Commercial Code and the Monopoly Act.

The capital fund of salt monopoly business and the reserve for monopoly price stabilization in accordance with the Monopoly Act are not necessarily of the same nature as those required by the Japanese Commercial Code, because they have been deemed funds for the salt operations. The Company is also subject to the Japanese Commercial Code with regard to the profit-oriented operations.

As regards the profit-oriented operations, the Japanese Commercial Code provides that a portion of retained earnings in an amount equal to at least 10% of cash dividends be appropriated as a legal reserve until such reserve equals 25% of the amount of common stock. This reserve is not available for dividends, but may be used to reduce a deficit by resolution of the shareholder or may be capitalized by resolution of the Board of Directors.

In accordance with the Japanese Commercial Code, the appropriations of retained earnings and bonuses to directors including cash dividends have been reflected in the financial statements in the period in which they are approved at the shareholder's meeting to be held in the following year.

10. Amounts per share relating to the profit-oriented operations

Amounts of net income and net assets per share, relating to the profit-oriented operations, are computed based on the weighted average number of shares of common stock outstanding during each year and on the number of outstanding shares of common stock at each balance sheet date, respectively. The information referred to above follows:

| Years ended March 31, | Yen | | U.S. dollars |
|-----------------------|----------|----------|--------------|
| | 1988 | 1989 | 1989 |
| Net income per share | ¥ 13,803 | ¥ 15,633 | \$ 118 |
| At March 31, | 1988 | 1989 | 1989 |
| Net assets per share | ¥455,405 | ¥467,004 | \$3,538 |

To compute the above figures, the net income and net assets relating to the salt operations have been excluded, owing to their not being subject to the shareholder's rights as described in Note 1.

11. Compensation to farmers

As a result of having ceased renewing contracts with farmers who had been contracted on a long-term basis, the Company paid ¥19,613 million (\$148 million) in 1989 as compensation.

The payments were included in "Other income (expenses)—Other, net" in the 1989 statements of income.

12. Commitments and contingencies

The Company is required to purchase all of the leaf tobacco produced, under the terms of the annual contract entered into with tobacco farmers, as stipulated in the Tobacco Business Code with regard to the method of purchasing the domestic crop. The purchase amount for the coming year is to be determined when the contracts are entered into with farmers, based upon the conclusions to be made by the Leaf Tobacco Council around September 1989.

The Company contracts various kinds of lease agreements. Annual rental expenses, primarily office premises, automobiles and computer equipment, came to ¥12,440 million and ¥19,230 million (\$146 million) for the years ended March 31, 1988 and 1989, respectively.

At March 31, 1989, the Company had no material litigations or claims outstanding, pending or threatened against it.

13. Subsequent event

The following plan for the appropriations of retained earnings for the year ended March 31, 1989 was approved at the shareholder's meeting held on June 28, 1989.

| | Millions of yen | Millions of U.S. dollars |
|---|-----------------|--------------------------|
| Cash dividends, ¥5,000 (\$38) per share | ¥10,000 | \$76 |
| Transfer to legal reserve | 1,000 | 7 |
| Bonuses to directors and statutory auditors | 711 | 1 |
| | <u>¥11,071</u> | <u>\$84</u> |

14. Profit-oriented operations

Under the Commercial Code and related accounting regulations, the Company is required to disclose the financial information of the profit-oriented operations together with the Company's financial statements which include the salt operations.

The financial information of the profit-oriented operations for 1988 and 1989 is shown on the following pages through page 34.

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PROFIT-ORIENTED OPERATIONS

FINANCIAL POSITION

March 31, 1988 and 1989

| | Millions of yen | | Millions of U.S. dollars |
|--|-------------------|-------------------|--------------------------|
| | 1988 | 1989 | 1989 |
| ASSETS | | | |
| Current assets: | | | |
| Cash | ¥ 74,780 | ¥ 79,427 | \$ 602 |
| Short-term investments, mainly time deposits and certificates of deposit | 52,277 | 95,247 | 721 |
| Trade notes and accounts receivable | 3,006 | 5,050 | 38 |
| Inventories | 850,591 | 766,172 | 5,805 |
| Other current assets | 10,126 | 15,591 | 118 |
| Total current assets | 990,780 | 961,487 | 7,284 |
| Property, plant and equipment: | | | |
| Land | 103,712 | 104,897 | 795 |
| Buildings and structures | 373,454 | 382,323 | 2,896 |
| Machinery and equipment | 318,241 | 321,989 | 2,439 |
| Vehicles and tools | 25,526 | 29,975 | 227 |
| Construction in progress | 6,381 | 2,934 | 22 |
| | 827,314 | 842,118 | 6,379 |
| Less accumulated depreciation | 412,013 | 427,064 | 3,235 |
| | 415,301 | 415,054 | 3,144 |
| Investments and other assets: | | | |
| Investments in subsidiaries and associated companies | 5,203 | 8,466 | 64 |
| Investment securities | 11,375 | 14,453 | 110 |
| Other assets | 24,656 | 23,535 | 178 |
| | 41,234 | 46,454 | 352 |
| | <u>¥1,447,315</u> | <u>¥1,422,995</u> | <u>\$10,780</u> |

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| | Millions of yen | | Millions of U.S. dollars |
|---|-----------------|------------|-----------------------------|
| | 1988 | 1989 | 1989 |
| LIABILITIES AND SHAREHOLDER'S EQUITY | | | |
| Current liabilities: | | | |
| Short-term bank loans | ¥ 56,000 | ¥ 61,000 | \$ 462 |
| Current portion of long-term debt | 140 | 228 | 2 |
| Excise taxes payable | 158,352 | 150,097 | 1,137 |
| Trade payables | 44,773 | 49,627 | 376 |
| Income taxes payable | 55,756 | 15,041 | 114 |
| Accrued employee bonuses | 10,073 | 9,181 | 69 |
| Other current liabilities | 1,557 | 5,185 | 39 |
| Total current liabilities | 326,651 | 290,359 | 2,199 |
| Non-current liabilities: | | | |
| Long-term debt | 16,374 | 16,632 | 126 |
| Liability for severance payments | 186,318 | 181,194 | 1,373 |
| Other non-current liabilities | 7,161 | 800 | 6 |
| | 209,853 | 198,626 | 1,505 |
| Commitments and contingencies | | | |
| Shareholder's equity: | | | |
| Common stock, ¥50,000 par value; | | | |
| Authorized—8,000,000 shares | 100,000 | 100,000 | 758 |
| Issued and outstanding—2,000,000 shares | 736,400 | 736,400 | 5,579 |
| Additional paid-in capital | 1,600 | 2,400 | 18 |
| Legal reserve | 72,811 | 95,210 | 721 |
| Retained earnings | 910,811 | 934,010 | 7,076 |
| Total shareholder's equity | ¥1,447,315 | ¥1,422,995 | \$10,780 |

2026230454

**PROFIT-ORIENTED OPERATIONS
RESULTS OF OPERATIONS**

Years ended March 31, 1988 and 1989

| | Millions of yen | | Millions of U.S. dollars |
|---|------------------|------------------|--------------------------|
| | 1988 | 1989 | 1989 |
| Net sales | ¥2,727,151 | ¥2,654,025 | \$20,106 |
| Cost of sales: | | | |
| Cost of products sold | 611,532 | 581,408 | 4,404 |
| Excise taxes on products sold | 1,793,452 | 1,735,411 | 13,147 |
| | <u>2,404,984</u> | <u>2,316,819</u> | <u>17,551</u> |
| Gross profit | 322,167 | 337,206 | 2,555 |
| Selling, general and administrative expenses | <u>215,268</u> | <u>236,816</u> | <u>1,794</u> |
| Operating profit | 106,899 | 100,390 | 761 |
| Other income (expenses): | | | |
| Interest income, net | 4,128 | 4,039 | 30 |
| Loss on disposals of property, plant and equipment | (473) | (3,460) | (26) |
| Other, net | 2,332 | (23,246) | (176) |
| | <u>5,987</u> | <u>(22,667)</u> | <u>(172)</u> |
| Income before income taxes | 112,886 | 77,723 | 589 |
| Income taxes | <u>85,280</u> | <u>46,455</u> | <u>352</u> |
| Net income | <u>¥ 27,606</u> | <u>¥ 31,268</u> | <u>\$ 237</u> |

**PROFIT-ORIENTED OPERATIONS
MOVEMENTS OF SHAREHOLDER'S EQUITY**

Years ended March 31, 1988 and 1989

| | Millions of yen | | Millions of U.S. dollars |
|---|-----------------|-----------------|--------------------------|
| | 1988 | 1989 | 1989 |
| Common stock | <u>¥100,000</u> | <u>¥100,000</u> | <u>\$ 758</u> |
| Additional paid-in capital | <u>¥736,400</u> | <u>¥736,400</u> | <u>\$5,579</u> |
| Legal reserve: | | | |
| Balance at beginning of year | ¥ 800 | ¥ 1,600 | \$ 12 |
| Add: | | | |
| Transfer from retained earnings | 800 | 800 | 6 |
| Balance at end of year | <u>¥ 1,600</u> | <u>¥ 2,400</u> | <u>\$ 18</u> |
| Retained earnings: | | | |
| Balance at beginning of year | ¥ 54,050 | ¥ 72,811 | \$ 552 |
| Add: | | | |
| Net income | 27,606 | 31,268 | 237 |
| Deduct: | | | |
| Cash dividends | (8,000) | (8,000) | (61) |
| Bonuses to directors and statutory auditors | (45) | (69) | (1) |
| Transfer to legal reserve | (800) | (800) | (6) |
| Balance at end of year | <u>¥ 72,811</u> | <u>¥ 95,210</u> | <u>\$ 721</u> |

15. Salt operations

The salt operations started with the capital fund of salt monopoly business of ¥25,683 million (\$195 million) and the reserve for salt monopoly price stabilization of ¥11,298 million (\$86 million). Under the provisions of the Monopoly Act, the results of operations are credited to the reserve for salt monopoly price stabilization and the reserve may be used only to offset the losses from the salt operations.

Summarized financial information of the salt operations included in the financial statements follows:

| | Millions of yen | | Millions of U.S. dollars |
|--|-----------------|----------------|--------------------------|
| | 1988 | 1989 | 1989 |
| At March 31, | | | |
| Current assets | ¥53,241 | ¥61,514 | \$466 |
| Other assets | 18,033 | 18,277 | 139 |
| | <u>¥71,274</u> | <u>¥79,791</u> | <u>\$605</u> |
| Current liabilities | ¥ 2,793 | ¥ 2,973 | \$ 23 |
| Other liabilities | 3,108 | 4,385 | 33 |
| | <u>5,901</u> | <u>7,358</u> | <u>56</u> |
| Capital fund of salt monopoly business | 25,683 | 25,683 | 195 |
| Reserve for monopoly price stabilization | 39,690 | 46,750 | 354 |
| | <u>65,373</u> | <u>72,433</u> | <u>549</u> |
| | <u>¥71,274</u> | <u>¥79,791</u> | <u>\$605</u> |
| Years ended March 31, | 1988 | 1989 | 1989 |
| Revenues | ¥70,705 | ¥69,937 | \$530 |
| Costs and expenses | 63,549 | 65,438 | 496 |
| Other income, net | 2,146 | 2,646 | 20 |
| Income taxes | 19 | 85 | 1 |
| Net income | <u>¥ 9,283</u> | <u>¥ 7,060</u> | <u>\$ 53</u> |

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**△ Tohmatsu Awoki
& Sanwa**

To the Board of Directors
Japan Tobacco Inc.

We have examined the non-consolidated balance sheets of Japan Tobacco Inc. as of March 31, 1988 and 1989 and the related non-consolidated statements of income and shareholder's equity for the years then ended, all expressed in Japanese yen. Our examinations were made in accordance with generally accepted auditing standards in Japan and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the non-consolidated financial statements referred to above present fairly the financial position of Japan Tobacco Inc. as of March 31, 1988 and 1989 and results of its operations for the years then ended, in conformity with applicable laws and generally accepted accounting principles in Japan consistently applied during the period except for the change made in 1989, with which we concur, in the method of valuing inventories as described in Note 4 of the notes to non-consolidated financial statements.

The United States dollar amounts shown in the accompanying non-consolidated financial statements have been presented solely for convenience. We have reviewed this translation and, in our opinion, the non-consolidated financial statements expressed in Japanese yen have been translated into United States dollars on the basis described in Note 3 to the non-consolidated financial statements.

Tohmatsu Awoki & Sanwa

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May 15, 1989
(June 28, 1989 with respect to Note 13)

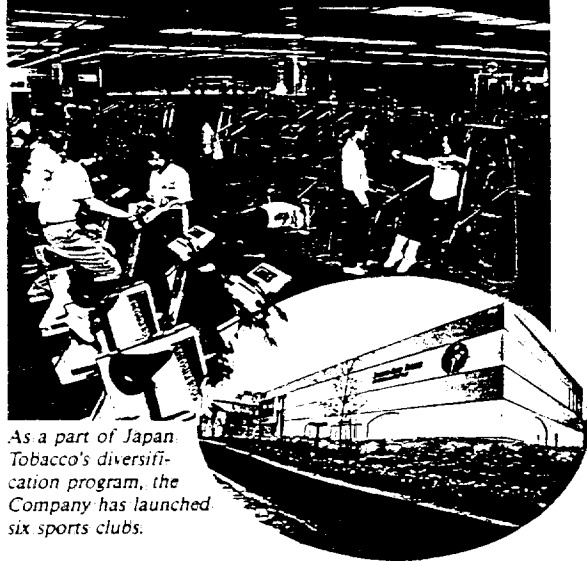
Touche Ross International

BEVERAGES



The HalfTime brand includes 23 different types of beverages. Nine of these feature herb additives to enhance the flavor.

PHYSICAL FITNESS BUSINESS



As a part of Japan Tobacco's diversification program, the Company has launched six sports clubs.

SALT PRODUCTION



Easy-to-use packaging is an important feature of these salt products sold for home use.

TOBACCO PRODUCTS



Japan Tobacco's 103 tobacco brands meet a wide range of smoking tastes. At present, five brands are manufactured under licensing agreements.

PHARMACEUTICALS AND HEALTH DRINKS



Introducing various products marketed and developed by Lifix: 12 over-the-counter preparations for treatment of colds, stomach disorders, a medicinal drink, and 3 kinds of health drinks.

2026230458

Implementation

OUR PRODUCT LINEUP

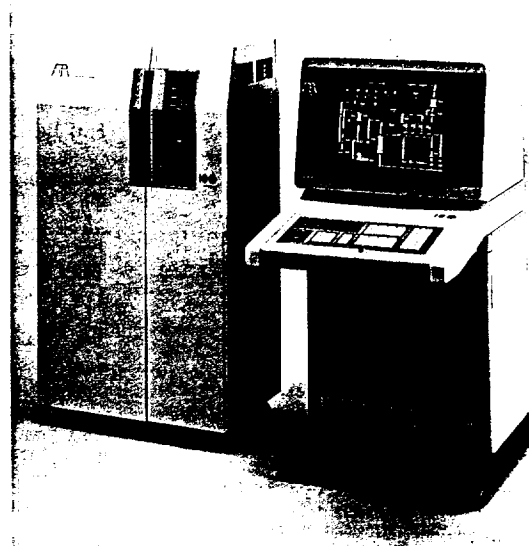


VENDING MACHINES



Vending machines attractively display Japan Tobacco's cigarettes and soft drinks. Sixteen types of these machines are in use for cigarette sales.

MACHINERY AND SYSTEMS



This sophisticated digital intelligent control system developed by Japan Tobacco is one example of the Company's capabilities to provide a wide range of equipment from tobacco manufacturing machinery to general-purpose manufacturing and control systems.

AGRIBUSINESS AND GARDENING SUPPLIES



The development of these gardening supplies, various food products, and other agricultural products is made possible through Japan Tobacco's extensive experience in agribusiness.

2026230459

CORPORATE DATA

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Phone: (03) 582-3111
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Telex: J 24865

Date of Establishment
April 1, 1985

Paid-in Capital
¥100 billion

Number of Employees
26,700

Offices & Factories
Regional Sales Headquarters 3
Area Sales Headquarters 14
Sales Offices 257

Regional Leaf Tobacco Headquarters 8
Regional Leaf Tobacco Offices 1
Leaf Tobacco Offices 70

Cigarette Manufacturing Factories 32
Processing Factories and Another Factory 11

Machine Factories 2
Printing Factory 1

Salt Industry Centers 11
Salt Industry Offices 11

Support Service Centers 6
Hospitals 2

Laboratories
Applied Plant Research Laboratory
Leaf Tobacco Research Laboratory
Tobacco Science Research Laboratory
Pharmaceutical Research Laboratories
Food R&D Center
Life Science Research Laboratory
Sea Water Science Research Laboratory
Plant Breeding and Genetics Research Laboratory
Engineering Research Laboratory
Toxicology Research Laboratories
Product R&D Center

(As of April 1, 1989)

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J1

T S R L

くつろぎの科学

The Science Behind Relaxation

2026230462

日本たばこ産業株式会社

たばこ中央研究所

JAPAN TOBACCO INC.

TOBACCO SCIENCE RESEARCH LABORATORY

最先端の科学技術を駆使し、たばこ文化の未来を拓く

The future for tobacco and its enjoyment using the latest science and technology

日本たばこの研究開発活動は、85年以上の歴史をもち、常に基本を大切に、着実な研究を重ねてきました。

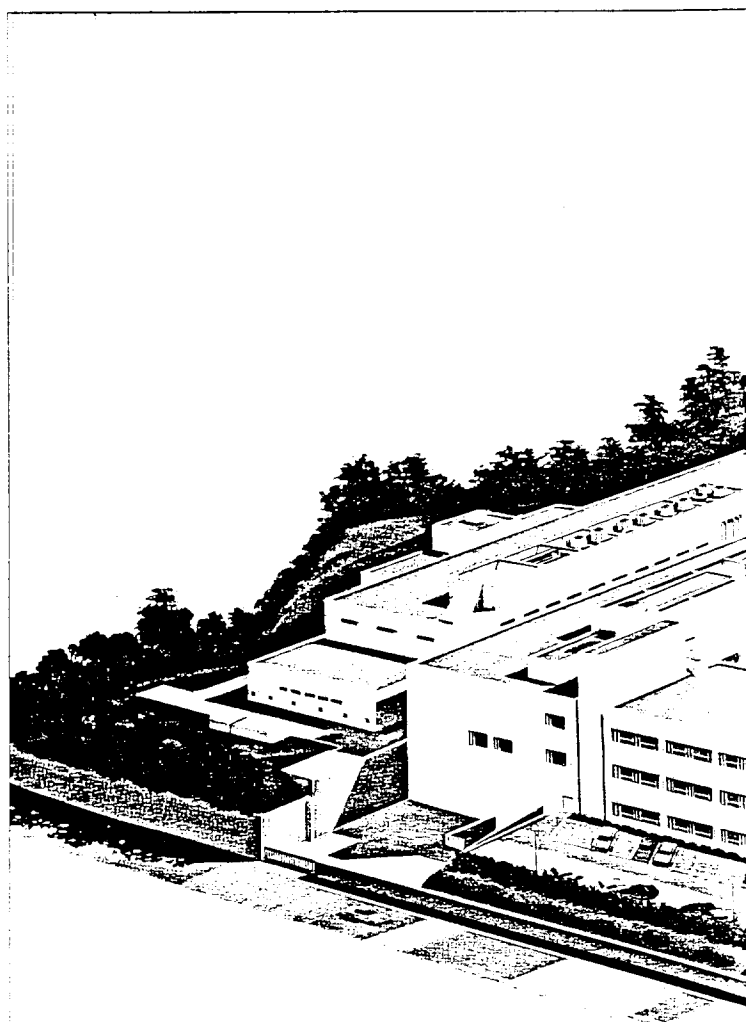
昭和63年4月に発足した“たばこ中央研究所”は、時代の声に応え、たばこの次世代商品への進化を現実のものとするための研究開発につとめています。

日進月歩する科学技術を駆使して、より洗練され高度化された新商品を創出し続けることが、研究所の使命であると考えています。

この小冊子では、研究開発の歴史や背景をはじめ、現在“たばこ中央研究所”がおこなっている研究活動についてご紹介します。

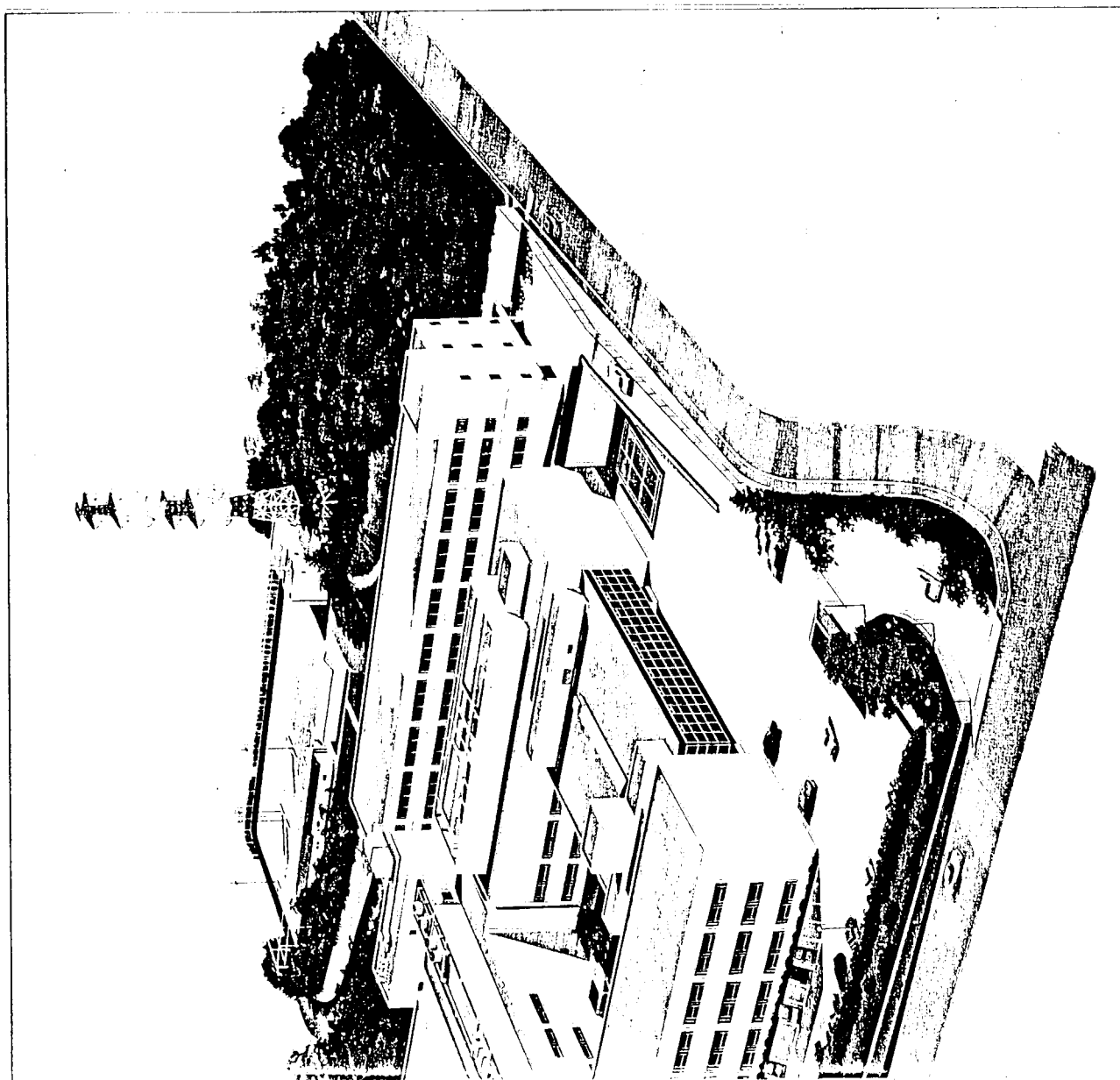
The Tobacco Science Research Laboratory (TSRL) was inaugurated in April 1988 to support research developing the tobacco of the future.

敷 地 total area 34,520m²
建面積 area of building 9,590m²
延面積 total floor space 22,350m²



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さらなる技術革新を目指して
Continuous pursuit of technological innovation

田本たばこ産業では、たばこを中心に、アグリ、バイオ、ケミカル、ドラッグからエレクトロニクス、エンジニアリングにいたる多角的な事業の展開を開始しました。昭和62年には、たばこ事業、塩専売事業に加えて、アグリ事業、医薬事業などの事業部体制をスタートしました。それともなって研究開発体制も各事業部に直結させ、より幅広いものとして整備されました。

なかでも各研究所の基幹となるたばこ中央研究所は、たばこをめぐる新技術の開発を通して、たばこの品質向上、コスト低減、および新商品の開発を基本目標としています。また、これら目的達成型の研究と同時に、長期展望に立った基礎的研究と新しい技術シーズの探索をおこなうことも、本研究所に託された大きなテーマです。

The basic goals of TSRL are improving the quality and lowering the price of tobacco products through the development of appropriate new technology, as well as creating new products made possible by this innovation. The Institute is also entrusted with basic scientific research and open-ended research on technological possibilities in the long run.

新商品開発に向けて
Development of tomorrow's tobacco products

香煙 煙草製品部 tobacco division

葉たばこ leaf tobacco

システム・エンジニアリング部 systems engineering division

事業部門別本社地方機関組織図

Organization

| | |
|-----------------|----------------------------------|
| ▶ 本社 | Head Office |
| ▷ たばこ事業 | Tobacco Business |
| 原料本部 | Leaf Tobacco Headquarters |
| 製造本部 | Manufacturing Headquarters |
| 営業本部 | Marketing Headquarters |
| 機械事業部 | Machinery Enterprise Division |
| 特機事業部 | Mechanical Enterprise Division |
| 印刷事業部 | Printing Enterprise Division |
| システムエンジニアリング事業部 | Systems Engineering Division |
| 医薬事業部 | Pharmaceutical Division |
| アグリ事業部 | Agribusiness Division |
| 塩専売事業部 | Salt Administration Headquarters |
| 総合サービス部 | Support Service Centers |

| | | |
|-----------|---|--------------------|
| ● ブレンド・調香 | blending・flavoring | |
| ● 新原料の開発 | development of new raw materials | |
| ● 原料の高度利用 | development of new raw materials | |
| ● 煙成分の改良 | improvement of the composition of tobacco smoke | ● 新商品 new products |
| ● 官能検査 | sensory test | |
| ● 加工処理 | leaf processing | |
| ● 新香料の開発 | development of new flavor substances | |

新しい商品の創造へ向けて、香料・フィルター・巻紙などの開発、煙成分の制御の研究等を進めています。
In order to develop tomorrow's tobacco products, TSRL is conducting steady research effort in various fields of tobacco production; flavor, filter, cigarette paper, composition of tobacco smoke and so forth.

▶ 地方機関 Offices & Factories

| | | | |
|--|---|----------------------------------|-----------------|
| ● 原料本部(8) | Regional Leaf Tobacco Headquarters | ● 原料事務所(55) Leaf Tobacco Office | ● 支所(15) Branch |
| ● 地方原料事務所(1) | Regional Leaf Tobacco Office | | |
| ● 葉たばこ研究所 | Leaf Tobacco Research Laboratory | | |
| ● (葉たばこ技術センター(3) Leaf Tobacco Technology Center) | | | |
| ● たばこ工場(32) | Cigarette Manufacturing Factory | | |
| ● 原料工場等(11) | Processing Factory | | |
| ● 製品開発センター | Product R&D Center | | |
| ● 営業本部(3) | Regional Sales Headquarters | ● 営業所(257) Sales Office | |
| ● 支店(14) | Area Sales Headquarters | | |
| ● 機械製作所 | Machine Factory | | |
| ● 明石製作所 | Machine Factory | | |
| ● 京都印刷工場 | Printing Factory | | |
| ● 生産技術研究所 | Engineering Research Laboratory | | |
| ● 医薬研究所 | Pharmaceutical Research Laboratories | | |
| ● (安全性研究所) | Toxicology Research Laboratories | | |
| ● 植物開発研究所 | Applied Plant Research Laboratory | | |
| ● 遺伝育種研究所 | Plant Breeding and Genetics Research Laboratory | | |
| ● 食品研究所 | Food R&D Center | | |
| ● たばこ由来研究所 | Tobacco Source Research Laboratory | | |
| ● 生命科学研究所 | Life Science Research Laboratory | | |
| ● 塩業センター(1) | Salt Industry Center | ● 塩業事務所(11) Salt Industry Office | |
| ● 海水利用研究所 | Sea Water Science Research Laboratory | | |
| ● 事務センター(6) | Support Service Center | | |

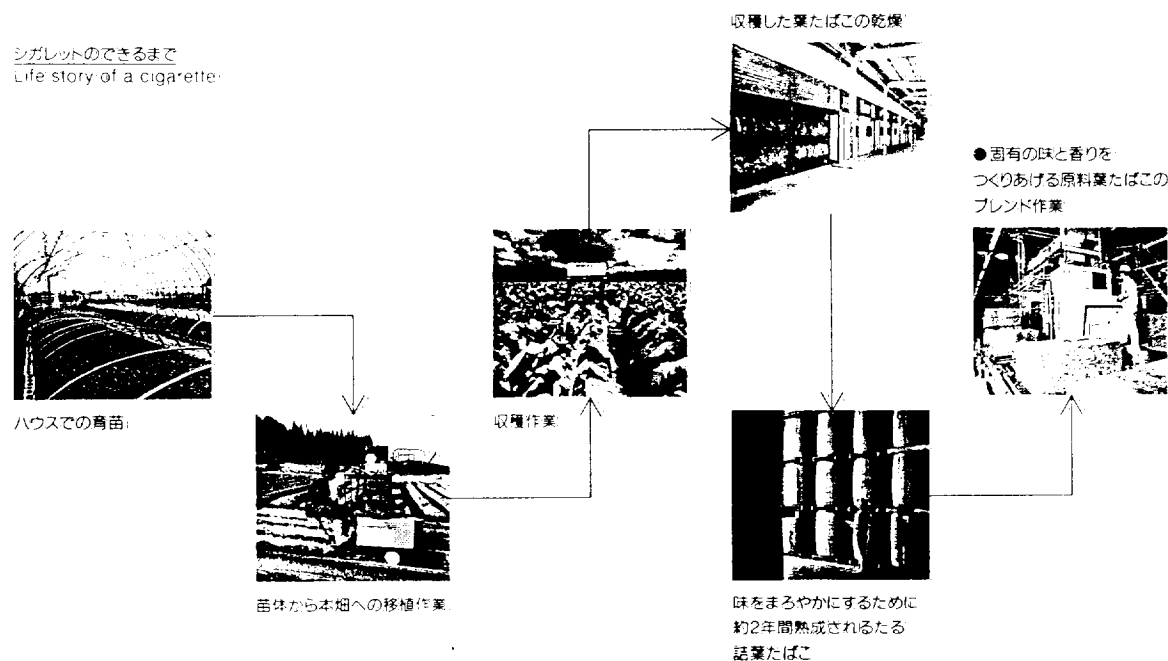
1本のたばこに込められる科学と技術 Science and Technology Incorporated into a single cigarette

たばこの味や香りは、原料となる葉たばこの生育条件などによって、微妙に変化します。そこで“日本たばこ”では、新品種の導入や栽培技術の改善などに努力する一方で、海外から国産のものとは異なる品質特性をもった葉たばこを輸入するなどして、ニーズの多様化に対応できる、良質な原料の確保につとめています。また、製造工程においてはコンピュータなどを駆使した最新技術を導入、優れた品質を安定して供給するためトータルな品質管理体制を実現しました。

たばこ中央研究所が開発した基礎技術や研究成果は、これらの工程の随所に生かされ、品質管理や新商品開発などに応用されています。

A cigarette's flavor and aroma partially depend upon the conditions under which the leaf tobacco was grown. Besides introducing new varieties and cultivation techniques to domestic tobacco growers, JT imports specific foreign tobacco, to ensure top quality ingredients capable of satisfying our customers' diverse needs. We also provide total quality control of production using state-of-the-art technology.

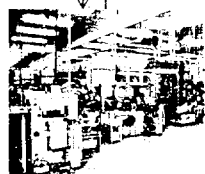
シガレットのできるまで
Life story of a cigarette



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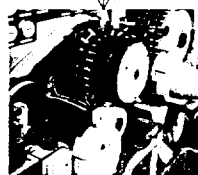
●製品ラインアップ



●1分間に5,000本を巻き上げる
直結形巻包機



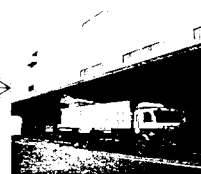
●包装工程



●巻上工程



●工程ラインを
集中コントロールする制御室



●出荷



店頭での販売

●たばこ中央研究所の
研究成果が応用される工程
The process by which
TSP's research findings
are implemented

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有機的に連環する5つの研究グループ Five interdependent research groups

たばこ中央研究所の研究領域は、大きく5つに分類することができます。味と香り、材料、煙、分析、そして支援システム——これら5つの研究グループの有機的な連環によって、たばこ研究の全体像が鮮やかに描き出されます。

たばこ中央研究所の総合的な研究成果は、さらに“日本たばこ”の他の研究所の研究成果をも含みながら、以下のような大きな目標に向かって統合されていきます。

●次世代商品のプロトタイプとして、新喫煙形態を指向した製品の開発。たとえばニコチンを付加したスモークレス製品、低副流煙・自己消火製品など●技術シーズとしてのたばこ原料の硬化・膨化・成型技術の開発。および、高圧ガスによる香料の抽出・分離技術、特定成分の濾過・吸着技術の追求●バイオテクノロジーを駆使した耐病・耐虫品種の作出、およびたばこ有用成分発現遺伝子の発見とその組み換え●たばこ工場の生産性向上のための技術開発。トータルプロセスにおける効率化・自動化の推進

くつろぎの科学 The Science Behind Relaxation

主要研究テーマの分野
Main research fields



②

材料の科学
次世代のフィルターと巻紙の創出のために
Materials science
Creating innovative filters and the papers



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TSRL's research objectives roughly focus on five fields——flavor and aroma, materials, smoke, analysis and supporting systems——which work together as an organic whole.

Some of the major themes of research are:

●The development of prototypes for major innovations in smoking. ●Developing techniques of tobacco stiffening and bulking as well as aroma extraction and the filtering out and adsorption of certain smoke components. ●Pioneering biotechnology to create disease and insect-resistant strains of tobacco, as well as discovering and splicing genes with useful properties. ●Technology development to improve tobacco plant productivity.



①

味と香りの科学

ゆたかさともろやかさを求めて

The study of flavor and aroma

Pursuing the pleasant and mellow



④

分析の科学

より厳密な物理・化学的特性の解明に向けて

Analytical research

Clarification of physical and chemical properties by more rigorous constraints



⑤

研究開発支援システム

最先端機器とノウハウを研究に生かす

R&D support system

Supporting research with the latest in technology and equipment



③

煙の科学

理想的な喫煙条件を実現するために

The appreciation of smoking

Ideal smoking conditions.



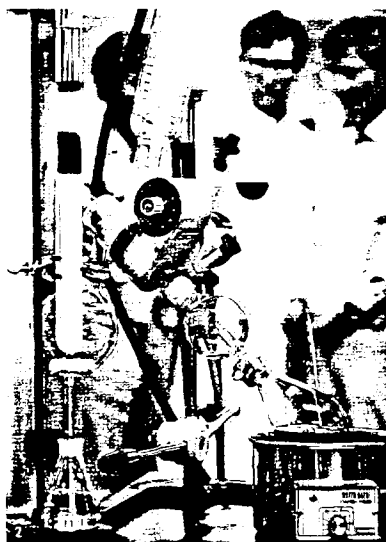
The study of flavor and aroma
Pursuing the pleasant and mellow

たばこ原料である葉たばこには1000以上の成分が含まれ、さらにそれが燃えることによって、特定されているものだけでも4000を越す成分に変化します。たばこの味と香りは、多くの化学成分の微妙なバランスによって形づくられているといっているでしょう。またアメリカブレンドの登場・普及以降は、香料を加えることによって味と香りのバラエティがさらに広がっています。

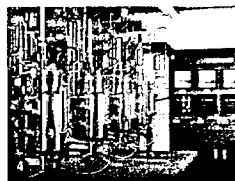
葉たばこ等の分析により香気成分の本体を解明すること、そして葉たばこの長所を生かし欠点をおさえる香料を開発することが、味と香りの研究の目的です。葉たばこや各種天然物の香気成分・生理活性成分の研究、液体炭酸や超臨界ガスを用いた香料および活性物質の抽出分離技術の開発、発酵技術を利用し微生物の代謝機能を使った香料生産や香気改善などの研究をおこなっています。



The following types of research are underway:
Research into the composition of various natural aromas and biologically active substances;
development ~~of liquid carbon dioxide and supercritical fluid extraction technology for aromatic and other active materials~~ research to develop flavor and aroma-improving technology based on the metabolic functions of microbes utilizing fermentation technology.



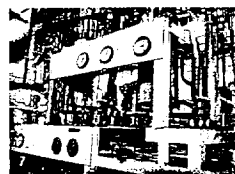
- ① 野生種(アンブラチカ)
- ② ロータリーエバポレーター
- ③ 無菌室
- ④ ジャーファーマンター
- ⑤ 香料サンプル
- ⑥ 高速液体クロマトグラフ
- ⑦ 高圧ガス抽出装置



11 Flavor and aroma



- ① Wild plant *N. umbratica*
- ② Rotary evaporator
- ③ Bio-clean room
- ④ Jar fermenter
- ⑤ Tobacco flavor
- ⑥ High performance liquid chromatograph
- ⑦ High pressure extractor



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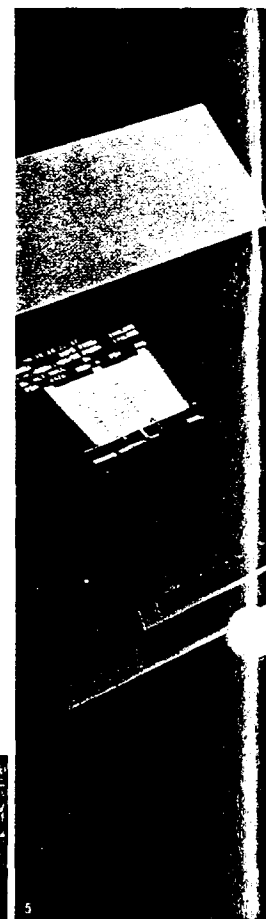
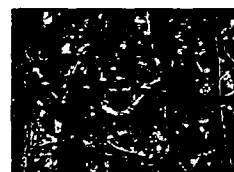
Materials science

Creating innovative filters and papers

原料たばこや香料をはじめとして、フィルターや巻紙は味や香りに大きく影響しています。またパッケージ材料は商品イメージと深くかかわっています。とりわけ低ニコチン・低タールシガレットが主流になった現在、これら材料品の研究開発成果は、新商品の開発と密接に結びついています。

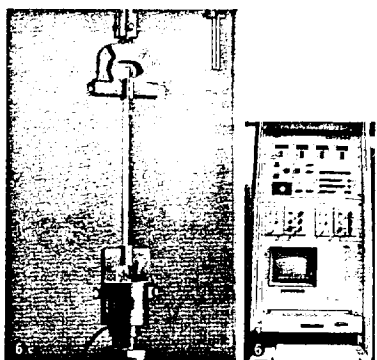
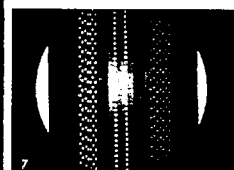
新規のフィルター、巻紙、包装材およびフィルター素材の開発、フィルター製造技術の開発を通じて、魅力溢れたシガレットの愛煙家への提供と材料品のコスト低減を目指しています。また商品設計機能の高度化を目的として、材料品の濾過、吸着、希釈、拡散機能によるニコチン、タール、ガス成分の調節機構を解析し、煙成分調節設計技法の確立を図っています。先端テクノロジーによる吸着剤、触媒などの高機能化の研究にもチャレンジしています。

The research covers the development of new filter materials, functional cigarette papers and manufacturing technology of new filters to improve tobacco products; and investigating the mechanism of filtration, adsorption, dilution and diffusion of smoke components by the filter and/or cigarette paper to control smoke delivery.



- ① フィルター見本
- ② 巻紙断面の顕微鏡写真
- ③ 巻紙開孔部の拡大写真
- ④ 試験用巻紙
- ⑤ X線マイクロアナライザーで
走査電子顕微鏡
- ⑥ 引っ張り試験機
- ⑦ 万能投影機で見た
開孔チップペーパー

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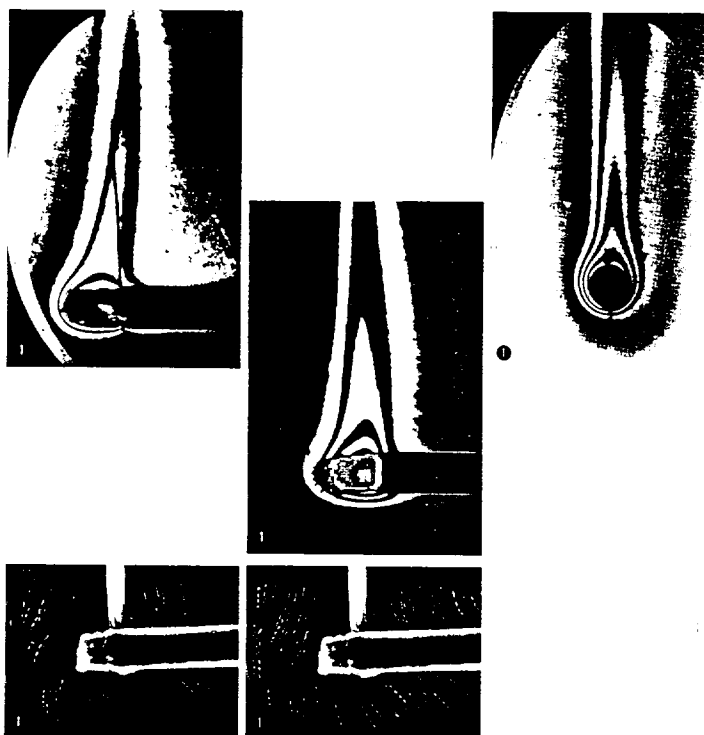
- ① Cigarette filters
- ② Microscope photograph of cigarette paper
- ③ Microscope photograph of perforated cigarette paper
- ④ Cigarette papers
- ⑤ X-ray microanalyzer
- ⑥ Tensile testing instrument
- ⑦ Perforated tipping paper

13 Materials

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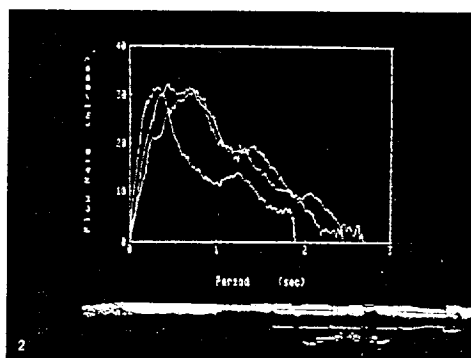
The appreciation of smoking:
Ideal smoking conditions.

同一種類のたばこでも、温度・湿度や吸い方など喫煙時の物理的ファクターによって、その風味は微妙に異なります。また煙の化学的成分も、同じ嗜好品であるコーヒーの数10倍とも言われるほど、複雑で多様です。これら喫煙時の物理・化学的諸条件と味覚との対応関係を明らかにする作業は、これまで人間の経験に頼る部分が多かったのですが、最新の測定装置を駆使することなどにより、客観的データを蓄積することが可能になりました。またシガレットの燃焼および煙粒子の生成機構の研究、副流煙や環境中の煙粒子・ニコチン・においの濃度測定法とその低減化技術に関する研究など、煙というデリケートな対象をめぐる様々な研究をおこなっています。

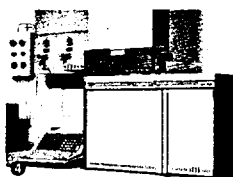


- ① 喫煙時の煙温度、
空気の流れ
- ② 喫煙プロフィール測定装置
- ③ 喫煙器
- ④ ガスクロマトグラフ

To find desirable smoking conditions and to cope with environmental problems related to smoking, research is being carried out on the mechanism of combustion and smoke particle production of the cigarette. The effects of physical and chemical properties of smoke on the taste of the cigarette are investigated by sensory tests. These relations can be evaluated objectively by using the latest measuring apparatus.



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- Temperature profile and a flow pattern during a puff
- Puff profile monitoring system
- Smoking machine
- Gas chromatograph

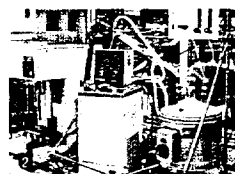
Analytical research

Clarification of physical and chemical properties by more rigorous

葉たばこのレオロジー的性質や化学成分は、製品としてのたばこの品質を大きく左右し、喫煙時に発生する熱と水分は、たばこ自体の物理的特性を変化させます。さらに喫煙後の灰の状態なども、たばこを総合的にとらえる場合の重要な要素となります。

これら原料としての葉たばこや材料品の物理・化学特性を多方面から解析し、製品の改良・開発に役立てることを目的として、様々な測定・実験がおこなわれています。物性および物性改善技術の研究としては、刻・たばこ巻の物性測定法の開発、刻の力学的特性の解明、たばこの喫煙・燃焼時の熱と水分移動現象の解明、たばこ刻の硬化・膨化法の技術開発をおこなっています。また有機化合物の構造解析も分析グループの大きな役割の一つです。

This research includes the development of methods measuring the physical and chemical properties of shredded and wrapped tobacco, investigating the nature of heat-release and moisture-movement, and development of new techniques to improve stiffening and bulking tobacco shreds.

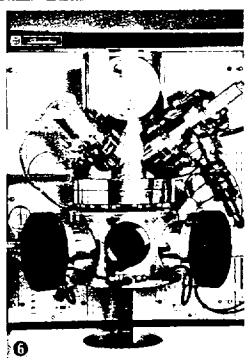
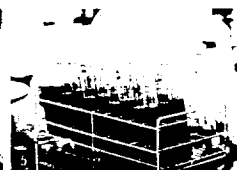


- ① 巻き硬さ測定装置
- ② 熱機械測定装置
- ③ 電子顕微鏡
- ④ 分析室
- ⑤ 分析サンプル
- ⑥ ESCA
- ⑦ FTIR



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constraints



- ① Cigarette hardness tester
- ② Thermomechanical analyzer
- ③ Electron microscope
- ④ Laboratory
- ⑤ Samples
- ⑥ ESCA
- ⑦ FTIR

17 Analysis

2026230478

研究開発支援システム

最先端の機器・ノウハウを研究に生かす

R&D support system

Supporting research with the latest in technology and equipment

たばこ中央研究所は、同じ青葉台にある各研究所の分析センターとしての役割もになっています。そのために、核磁気共鳴装置、質量分析装置、GC-MS、電子顕微鏡、X線マイクロアナライザー付電子顕微鏡、X線光電子分光分析計、X線回折分析装置、プロテイン・シーケンサー、DNAシンセサイザー、ペプチド・シンセサイザーなどを使用する分析要請に応えるとともに、各種機器分析法、葉たばこや香料等の微量分析法の開発をおこなっています。

また研究開発をめぐる各種情報を、コンピュータを利用して効率的に収集・処理・活用するための研究情報システムも、たばこ中央研究所が中心になって開発しています。このシステムは、所内ネットワークの構築および分析機器とコンピュータとの連動化を目標とし、所内化合物データベース、実験データ解析、図書・研究報告管理、報告書作成などの機能を含んでいます。なお、外部商用データベースを利用するための環境も整備されています。

TSRL serves as a lab-center for analysis for other research facilities, as well as working on the development of instrumental analysis and microanalysis techniques useful for measuring microamounts of chemical components in tobacco leaves and smoke.

A computer-based information system capable of efficiently storing and processing the important data resulting from our R&D work has been put into operation at TSRL.



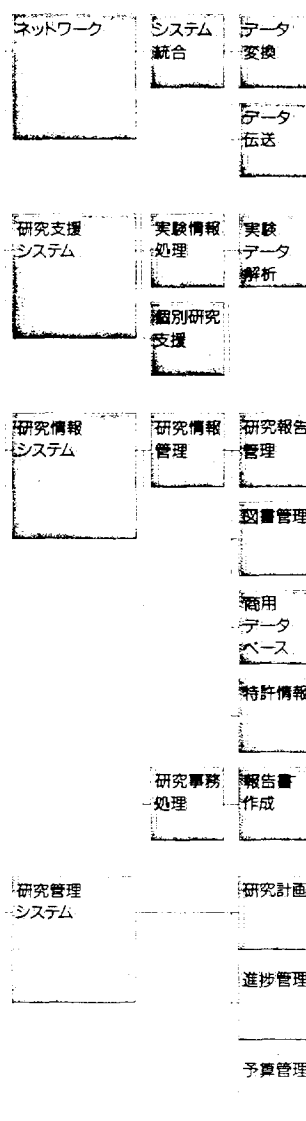
① NMR
② 質量分析装置
③ コンピュータ室



- ① NMR
- ② Mass spectrometer
- ③ Computer room

コンピュータシステム図
Diagram of computer system

研究情報
システム
(JTRIS):



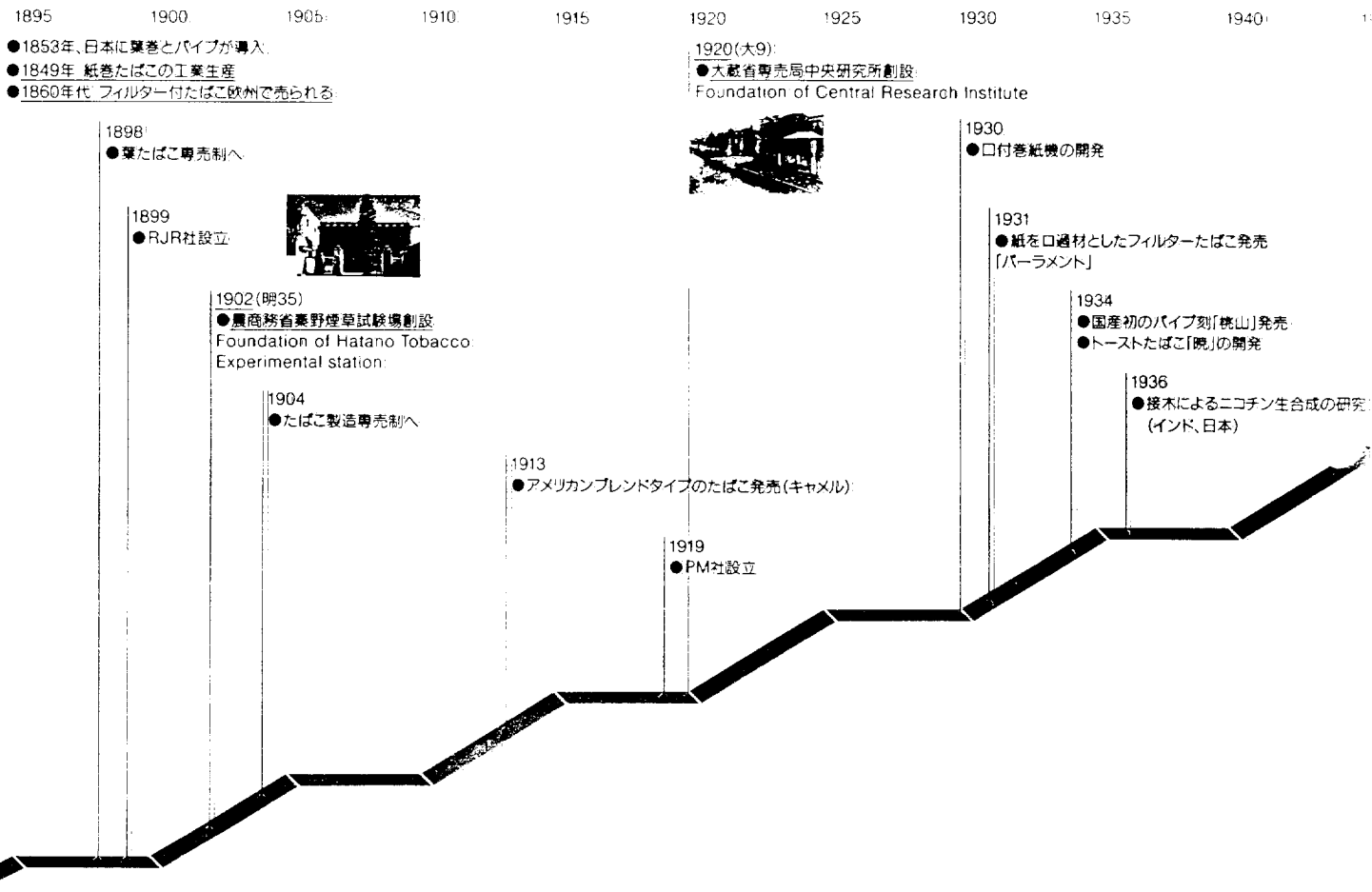
たばこをめぐる技術とたばこ中央研究所のあゆみ

A historical perspective on tobacco technology and ISEI

たばこは500年におよぶ歴史のなかで、幾多の変遷を経てきました。なかでも葉巻、パイプ、刻みなどの伝統的喫煙形態からシガレットに脱皮したのが、最大のイノベーションと言えるでしょう。シガレットにおいては、巻紙の工業化とボンザック型巻上機の開発が初期の成果でした。さらに香料の使用とバーレー葉のトースト処理を組み合わせ

た安価なアメリカンブレンドの創製は、本国たばこ産業の隆盛をもたらすことになります。第二次世界大戦後は消費者の嗜好に対応して、フィルターの開発・導入から、巻紙・チップペーパーへの微細な開孔技術を駆使した低タール革命へと続き、技術革新の大きな潮流をつくっています。

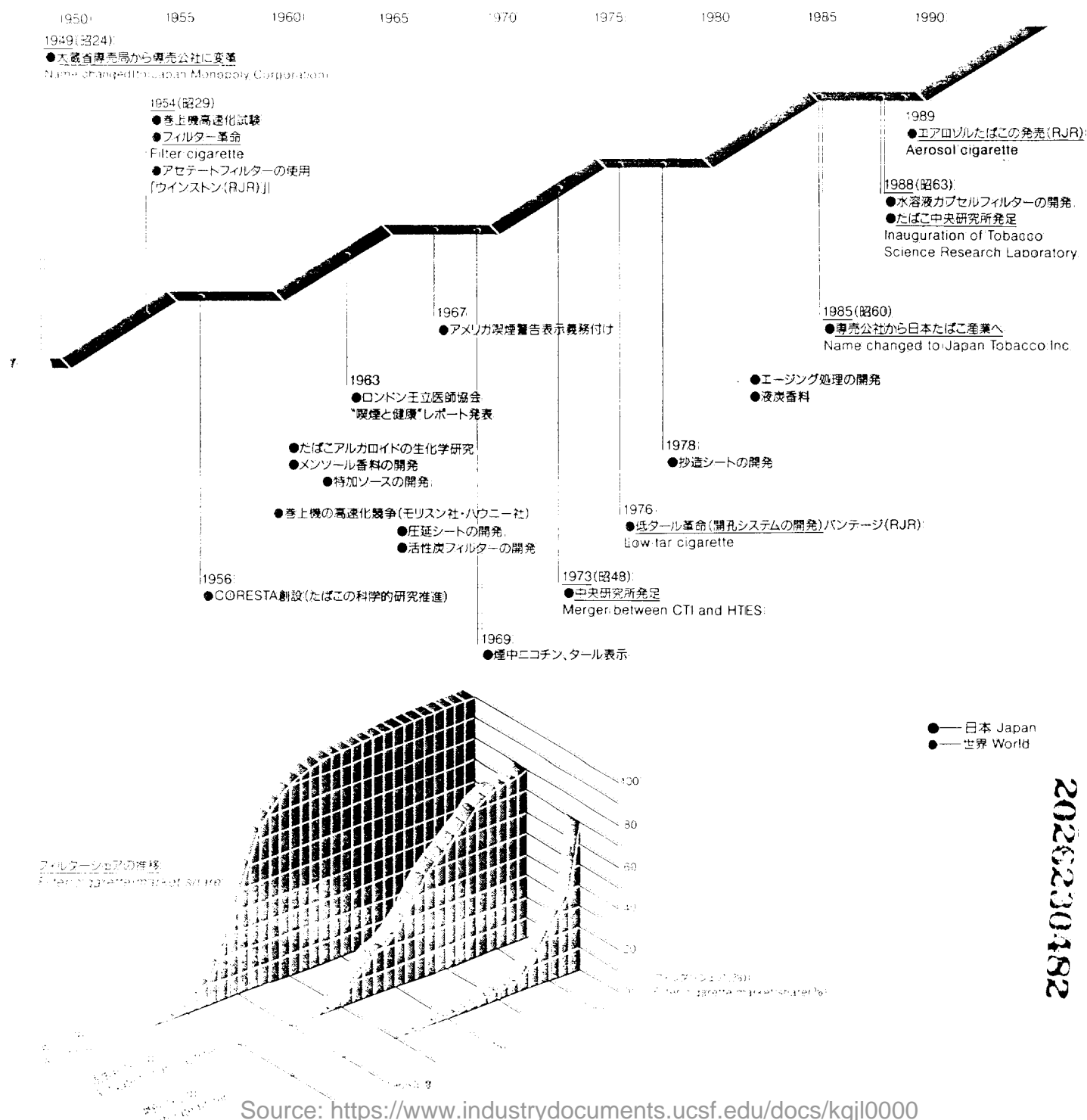
年表 Chronology



2026230481

the cigarette, itself the biggest innovation in tobacco history, was further popularized by the mass production of wrappers and the Bonsack wrapping machine, followed by the low-price American cigarette made possible by the use of aromatic essences and toasted

Buñey tobacco leaves. In the postwar period, the relationship between smoking and health resulted in a technological race to create low-tar cigarettes through use of filters and other methods.



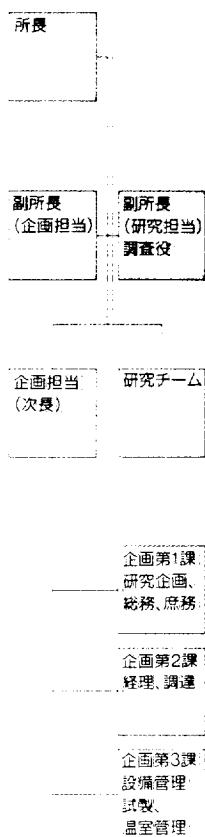
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研究をサポートする各種施設

Support services for other research facilities

たばこ中央研究所は、青葉台にある各研究所の基幹として、研究設備や福利厚生設備の管理、保守・保守などを通して、研究活動をトータルにサポートしています。

たばこ中央研究所組織図
System of organization



- 図書室
- 研修棟
- 温室



- Library
- Recreational facilities
- Greenhouse

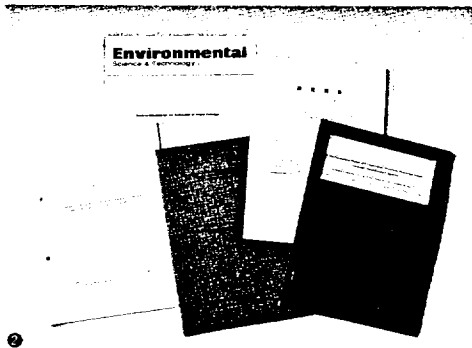
As the central institute for all of JT's research facilities, TSRL is responsible for supporting research activities through the management and maintenance of research facilities and employee welfare facilities.

国際的な研究交流を展開 *International research exchange*

たばこ中央研究所では、国内会議の主催・参加はもちろん、国際会議など、海外との研究交流も積極的に展開しています。常に世界の科学動向の最先端を鋭敏にキャッチし、リードし続ける努力をおこなっています。国際的に権威のある学会誌、雑誌などへの研究論文の発表も盛んにおこなわれています。これらの成果が、新しいたばこ文化の創造へ向け結集されていきます。



① 国際会議 (中国)
② 数々の発表論文

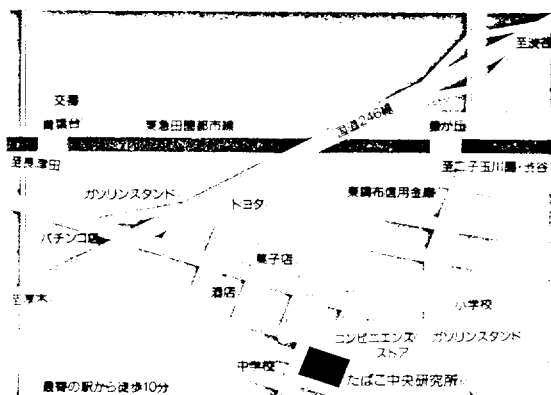


① International conference (in session) (China);
② Publications.

TSRL will actively endeavor to host and participate in international research exchanges at home and abroad, taking care to be up to date with the latest information and remain at the forefront of this important industry.

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JT

LSRL

生命——その未知なる世界を探究する
Exploring New Science Fields of Life

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日本たばこ産業株式会社
生命科学研究所
JAPAN TOBACCO INC.
Life Science Research Laboratory

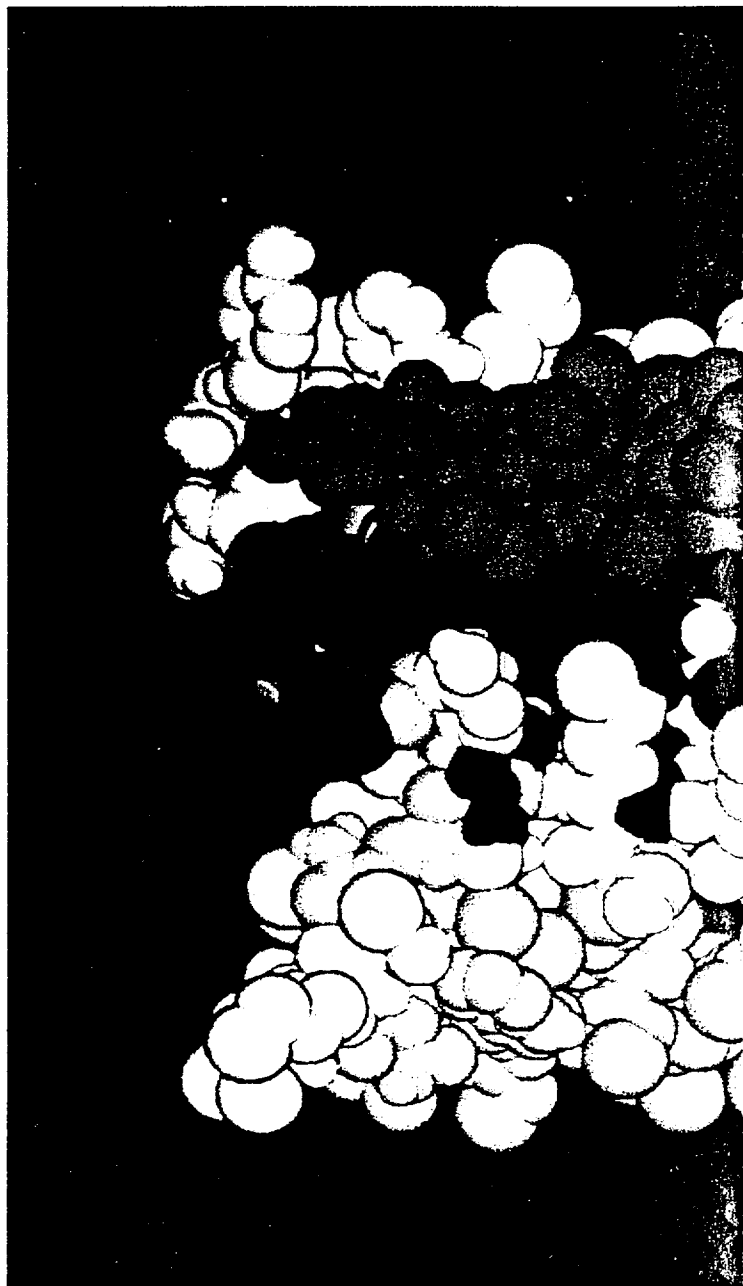
生体のかぎりない機能を求めて

Learning from the miraculous living organism

数十億年の進化の過程を経た生体や生命は、認識、応答をはじめとした、精緻な様々の機能をもっています。

生命科学研究所は、無限の可能性を秘めたこの生体や生命の機能の研究を通して、日本たばこの多様な事業のブレイクスルーと新しい事業シーズの探索をおこなっています。

Life, through billions of years of evolution, has acquired diverse and incredibly sophisticated recognition and response abilities. Investigating the infinite functions inherent in natural life, Life Science Research Laboratory is discovering breakthroughs useful to various enterprises of Japan Tobacco Inc., and planting seeds for further growth.

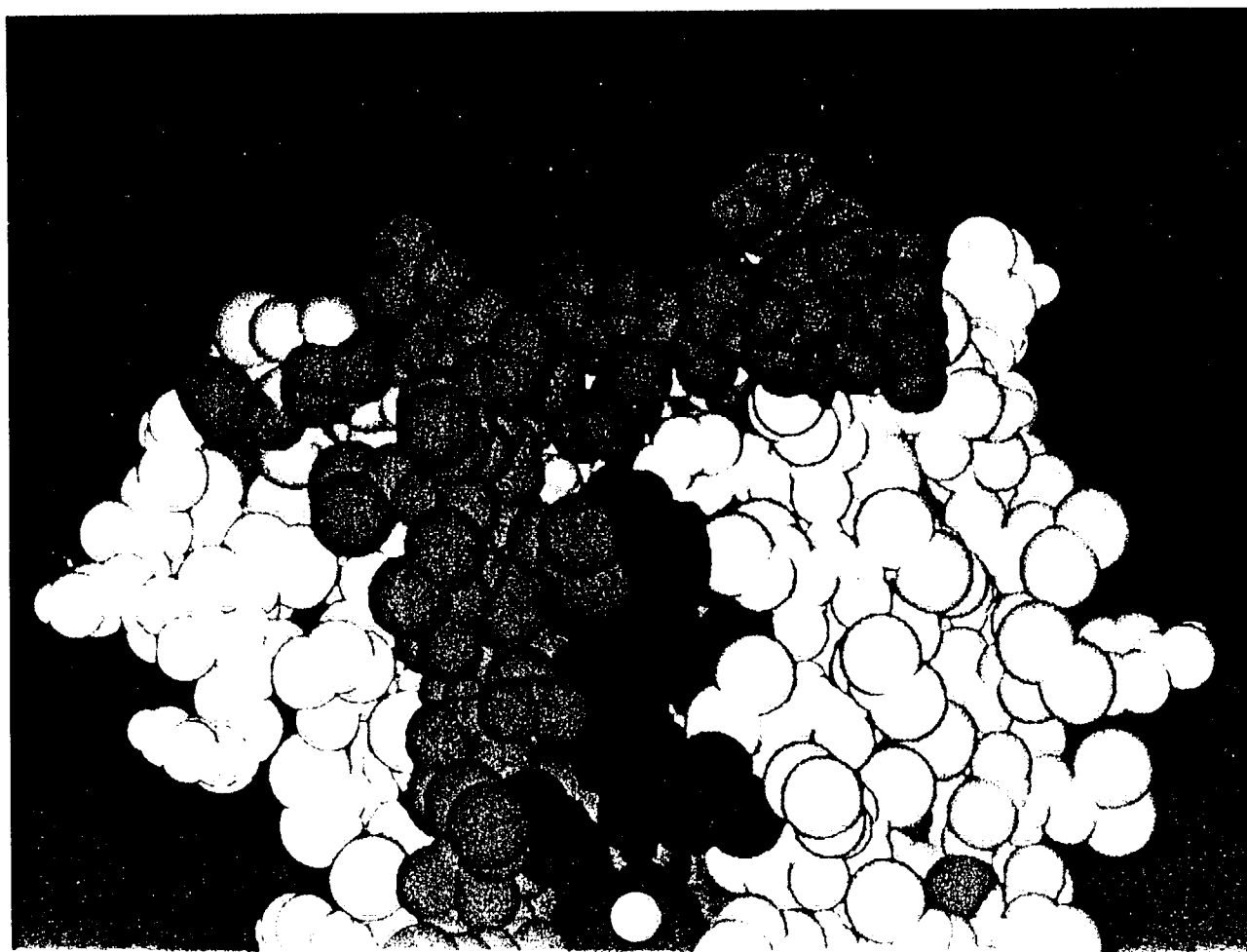


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©バクテリオロドプシン
(光受容タンパク質)の
推定構造

©Proposed structure
of bacteriorhodopsin



認識するウイルス

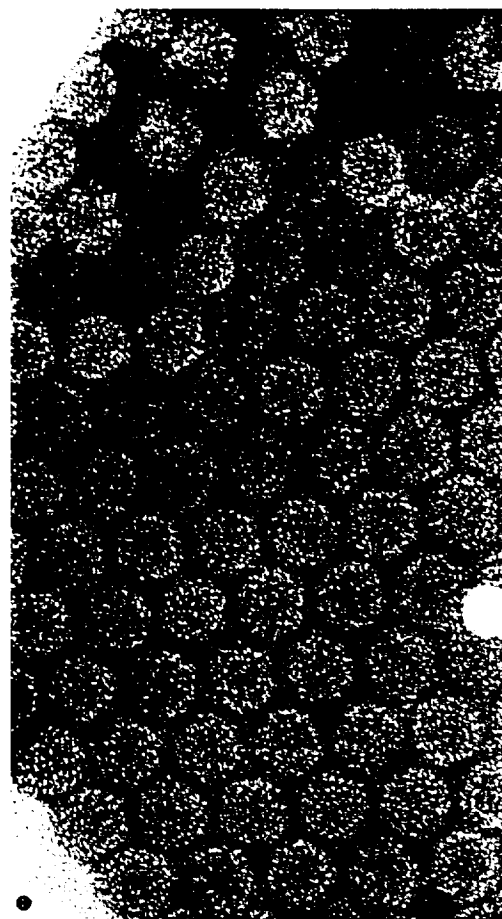
植物ウイルス研究からのアプローチ

Viruses and Genes

植物ウイルスRNAは自己複製能をもつ遺伝子です。そこでウイルス研究は必然的に遺伝子に関する研究へと発展することになります。すでにキュウリモザイクウイルス(CMV)に寄生するサテライトRNAのcDNAをタバコの核遺伝子に組み込むことにより、CMV抵抗性タバコの作出に成功しました。

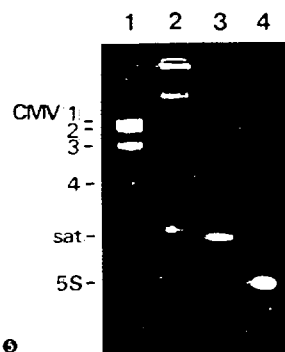
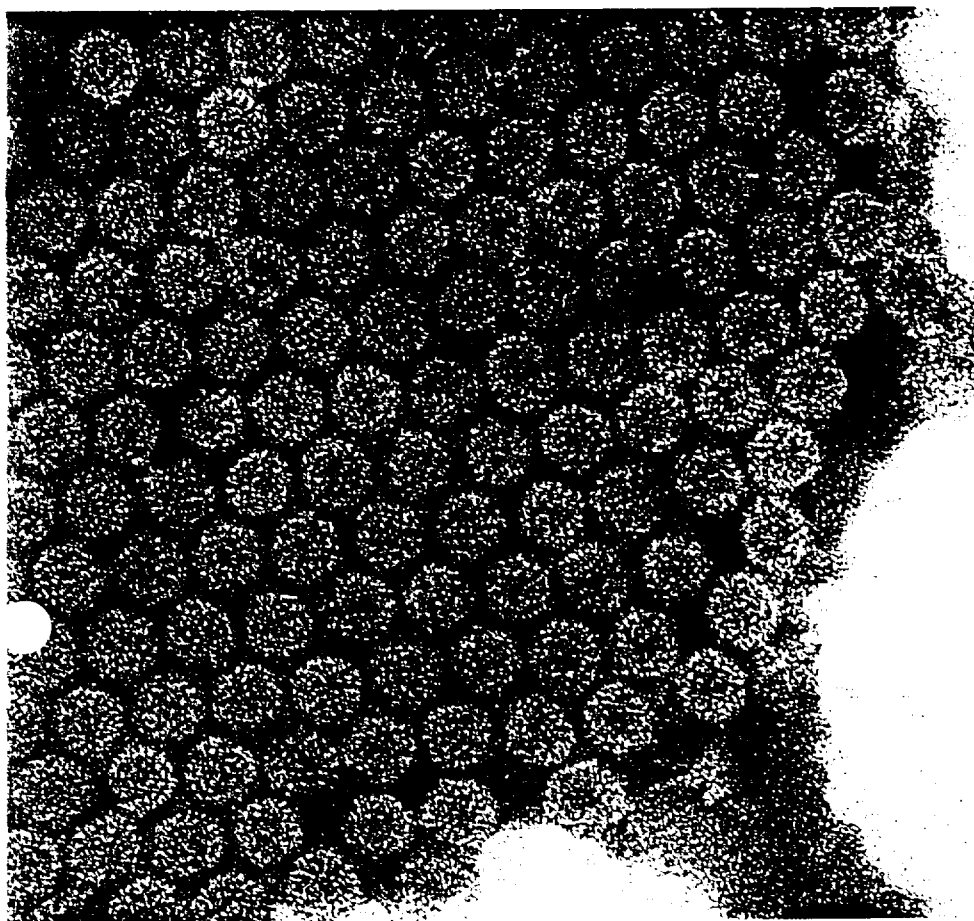
あるウイルスが特定の宿主だけを特異的に認識し、増殖していくという一連のメカニズムを探ることがこれからの大きな研究対象です。

Most plant viruses have self-replicating RNA genes. Therefore, our viral research inevitably leads to molecular biology. We have already succeeded in producing transgenic tobacco plants resistant to cucumber mosaic virus (CMV) by introducing cDNA of CMV satellite RNA. Elucidating the mechanisms of how a virus recognizes its own hosts and multiplies is an exciting challenge.



- ① キュウリモザイクウイルスの電子顕微鏡写真
- ② タバコモザイクウイルスの電子顕微鏡写真
- ③ サテライトRNAによるキュウリモザイクウイルス感染メロンの病徴軽減
- 左: ウイルス感染
- 中央: ウイルス-サテライトRNA感染
- 右: 健全
- ④ DNA塩基配列決定装置
- ⑤ RNAのアガロースゲル電気泳動

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① Electron micrograph of cucumber mosaic virus.

② Electron micrograph of tobacco mosaic virus.

③ Symptom attenuation on cucumber mosaic virus infected melon plants by satellite RNA: left: Infected with virus; center: infected with virus and satellite RNA; right: Healthy control.

④ DNA sequencer.

⑤ Agarose gel electrophoresis of RNA.

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細胞分化、ガン化とタンパク質

細胞分化、タンパク質研究からのアプローチ

Proteins, Cell Differentiation and Cancer

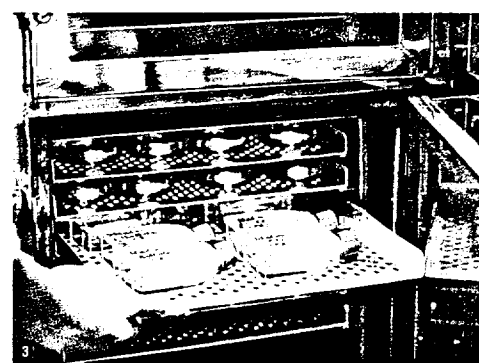
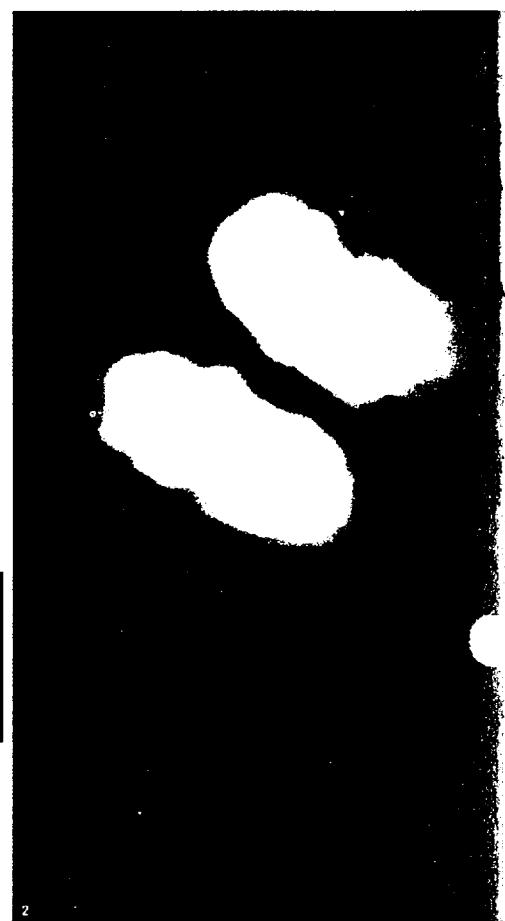
発ガン機構と細胞分化機構の解明は、細胞・タンパク質研究にとっての最大の関心事です。これらに關与するタンパク質について、遺伝子組換え技術、X線結晶解析技術を駆使して構造を明らかにするとともに、ガン化、細胞分化における機能を解明します。

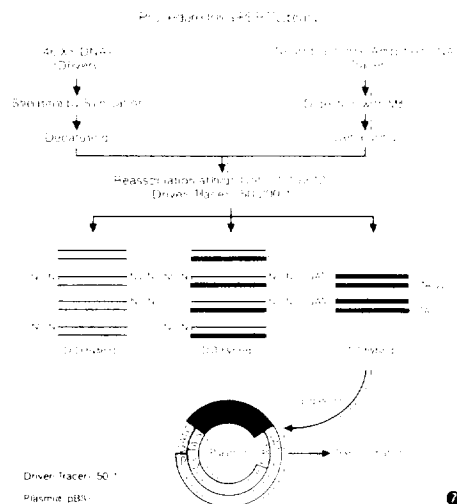
また遺伝子の構造と機能の面に対しても、アプローチしていきます。

One of our interesting targets is the elucidation of cell differentiation and carcinogenesis mechanisms. Learning more about the structure and function of proteins with the aid of genetic engineering technology and X-ray crystallographic analysis will help us to understand the differentiation and carcinogenesis processes step by step. We are also pursuing an understanding of the structure and function of various genes.



- 核顆粒と中間径繊維
(ハムスター-BHK21細胞
間期)
- 核の顆粒状物質と染色体
(ヒラ細胞 分裂期)
- 赤: 中間径繊維タンパク質に
対するモノクローナル抗体
により認識された核の:
顆粒状物質
青: 染色体
- 炭酸ガスインキュベーター
- 染色体標本
- チャイニーズハムスター
V79細胞の染色体
- リポポリサッカライド:
(LPS)処理により:
マクロファージ様に分化した
マウスJ774-A1細胞
- ヒト神経芽細胞腫より:
増殖ガン遺伝子の分離





- Nuclear granules:
and intermediate
filaments (Hamster
BHK21 cell, interphase).

- Nuclear granules and chromosomes (HeLa cell mitotic phase)

red: Nuclear granules
recognized by a
monoclonal antibody
to intermediate
filament protein
blue: Chromosomes
stained by Hoechst
33258.

- ③ CO₂ incubator

- ➊ Chromosome preparation:

- 5** Chromosomes of a Chinese hamster V79 cell

- 6** Mouse J774A1 cells differentiated into macrophage-like cells by LPS-treatment

- ### 7 Procedure for a PERT Library



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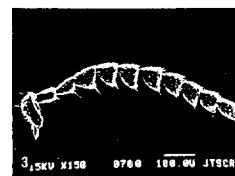
フェロモンの応答

昆虫フェロモン研究からのアプローチ

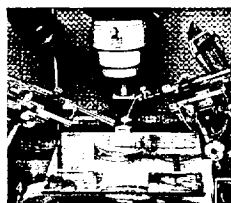
Insects and Pheromones

タバコシバンムシやワモンゴキブリなどの昆虫では、雄は雌が分泌する性フェロモンに誘引されます。

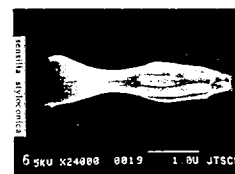
空気中に数ある化合物の中から、同種の雌の分泌するフェロモンだけを特異的に認識し、応答するメカニズムについて、計算化学、電気生理学などを応用し、学際的な研究をすすめています。



In many insect species, including the common cockroach and cigarette beetle, the male is attracted by a pheromone secreted by the female. We are using state of the art computational chemistry and neurophysiology in an interdisciplinary effort to elucidate the mechanisms of how the receptor in the male antenna can recognize only the female's pheromone molecule among many other airborne chemicals.



- ① 昆虫の神経伝達系
- ② 昆虫の脳 (ゴキブリ)
- ③ 昆虫の触角 (タバコシバンムシ)
- ④ 昆虫触角のフェロモン認識反応分析装置 (エレクトロアンテノグラフ)
- ⑤ セリコルエン (タバコシバンムシの性フェロモン) の立体構造
- ⑥ フェロモン感受毛 (タバコシバンムシ)



- ① Insect neurosystem
- ② Insect brain (cockroach)
- ③ Insect antenna (cigarette beetle)
- ④ Electroantennograph
- ⑤ Computer graphics of serricornin, the sex pheromone of cigarette beetle and its analogues.
- ⑥ Pheromone sensillum (cigarette beetle)

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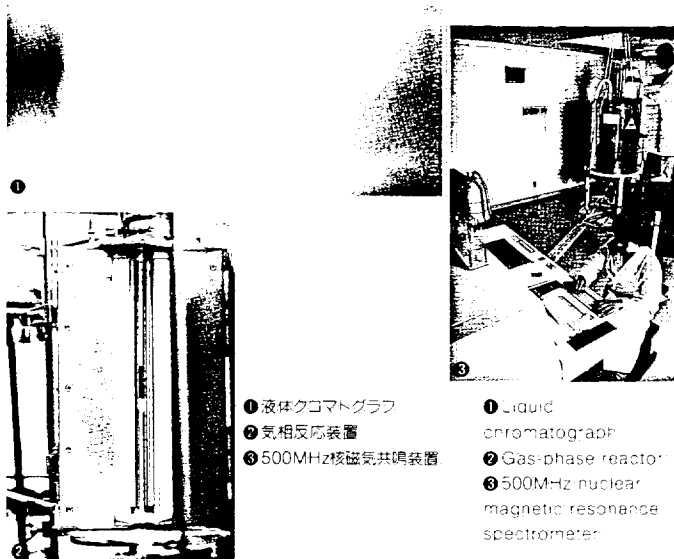
Biomimetic Chemistry

有機金属化学や触媒化学を中心に有機化学と無機化学の融合が図られ、官能基の変換、炭素-炭素結合による骨格構成が比較的容易になってきています。しかし、試験管内での不斉合成、位置選択性、立体選択性などの反応は、生体内でおこなわれている生合成反応にはまだまだ遠く及びません。

生合成反応を模倣し、様々な有用化合物を効率よく合成する反応を見だし、その有用性を検証することは、これからの大きなテーマです。



By fusing inorganic with organic chemistry based around organometallic and catalytic chemistry, the transformation of the functional groups and the construction of the carbon skeletons should be relatively easy. Nevertheless, our laboratory effects are still crude compared to what occurs in nature. A major aim of this work is to discover the processes whereby useful compounds may be efficiently produced by mimicking natural biosynthetic processes.

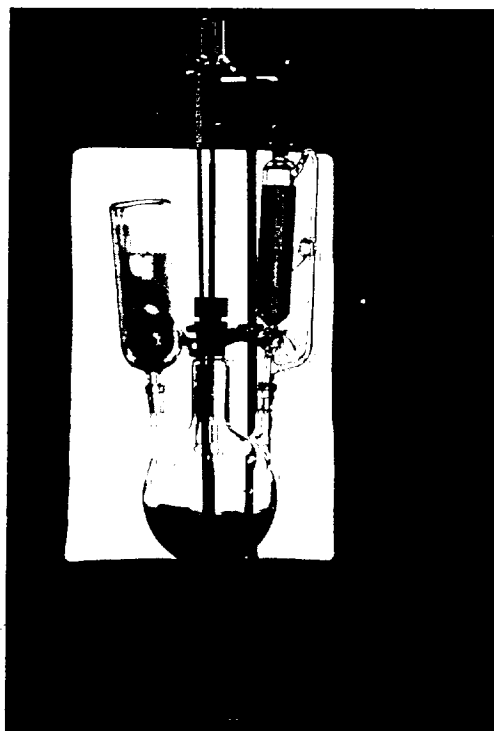


① 液体クロマトグラフ
② 気相反応装置
③ 500MHz核磁気共鳴装置

① Liquid chromatograph
② Gas-phase reactor
③ 500MHz nuclear magnetic resonance spectrometer

生命科学研究所の概要

Life Science Research Laboratory A Summary



生命科学の研究は限りない発展性を秘めています。人間のより良い生活文化の創造を目指し、私たちは生命の認識機構の解明を第一歩として、着実な前進を続けていきたいと考えます。

Life science research is brimming with potential. In order to improve the quality of our lives, we hope to unlock the secrets of biological recognition mechanisms as a first step in our continued efforts to realize this exciting potential.

生命科学の研究

Outline of Life Science Research

動植物の
ホメオスタシスの
制御方法

Homeostasis

動植物へ
新しい機能の導入

Transgenic
animals and
plants

ホメオスタシスの
制御物質

Controlling
substances of
homeostasis

認識制御物質

Controlling
substances of
recognition

高度情報処理技術の
基礎となる
アルゴリズム・素子

Algorithms and
elements;
sophisticated
data processing
is based on

高性能センサ

High
performance
sensors

機能性高分子集団

Functional high
molecules

新触媒・人工酵素

New catalysts
and artificial
enzymes

生命科学の研究

Outline of life science research

生命の認識機構の解明

To understand the mechanisms for biological recognition

ウイルスの研究

Virology
research

蛋白質の研究

Protein research

生物活性分子の研究

Bioactivity
research

細胞分化の研究

Cell
differentiation
research

昆虫の認識機構の研究

Insect
recognition-
mechanism
research

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研究開発組織
Organization
of R&D

社長
President and Chief
Executive Officer

医薬事業部
Pharmaceutical
Division

薬量研究所
Pharmaceutical
Research
Laboratories

遺伝育種研究所
Plant Breeding and
Genetic Research
Laboratory

植物開発研究所
Applied Plant
Research Laboratory

食生活研究所
Food R&D Center

生産技術研究所
Engineering
Research
Laboratory

葉たばこ研究所
Leaf Tobacco
Research Laboratory

製品開発センター
Product R&D Center

たばこ中央研究所
Tobacco Science
Research Laboratory

生命科学研究所
Life Science
Research Laboratory

海水総合研究所
Sea Water Science
Research Laboratory

技術企画室
Technological
Planning Dept

特許室
Patent Dept

安全性研究所
Toxicology Research
Laboratories

施設管理
施設生理実験室
施設生理実験室
ウイルス実験室
酵素実験室
遺伝子組換え実験室
X線結晶解析室
低温実験室
有機合成実験室
塩毒実験室
動物飼育室
植物培養実験室
温室
一般実験室
居室

Main Facilities:
Cell physiology laboratory
Electrophysiology laboratory
Virology laboratory
Enzyme laboratory
Genetic engineering laboratory
X-ray crystallography laboratory
Cold room
Organic synthesis laboratory
Culture laboratory
Animal room
Plant cultivation laboratory
Greenhouse
General laboratory
Office

主要分析機器
Equipment
NMR (500, 300MHz)
FTIR
MS (LC, GC)
ESCA
電子顕微鏡 (走査型、
透過型, XMA)
Electron microscope
超遠心分離機
Ultra centrifuge
DNAシーケンサー
DNA sequencer
DNAシンセサイザー
DNA synthesizer
ペプチドシーケンサー
Peptide sequencer
ペプチドシンセサイザー
Peptide synthesizer
FPLC
30L培養槽 (4基)
Jar fermentor (30L x 4)
IRIS 4D 70G
VAX 8530 750
等

アグリ事業部
Agribusiness Division

システム・エンジニアリング
事業部
Systems Engineering
Division

原料部
Domestic Leaf
Tobacco Division

製造部
Manufacturing
Division

基礎技術研究所
Fundamental
Research Division

塩務事業本部
Salt Administration
Headquarters

企画部
Planning Division

JAPAN TOBACCO INC.
Life Science Research Laboratory
6-2, Umegaoka, Midori-ku, Yokohama, Kanagawa 227 JAPAN
Telephone : (045)972-5901
Facsimile : (045)972-6205



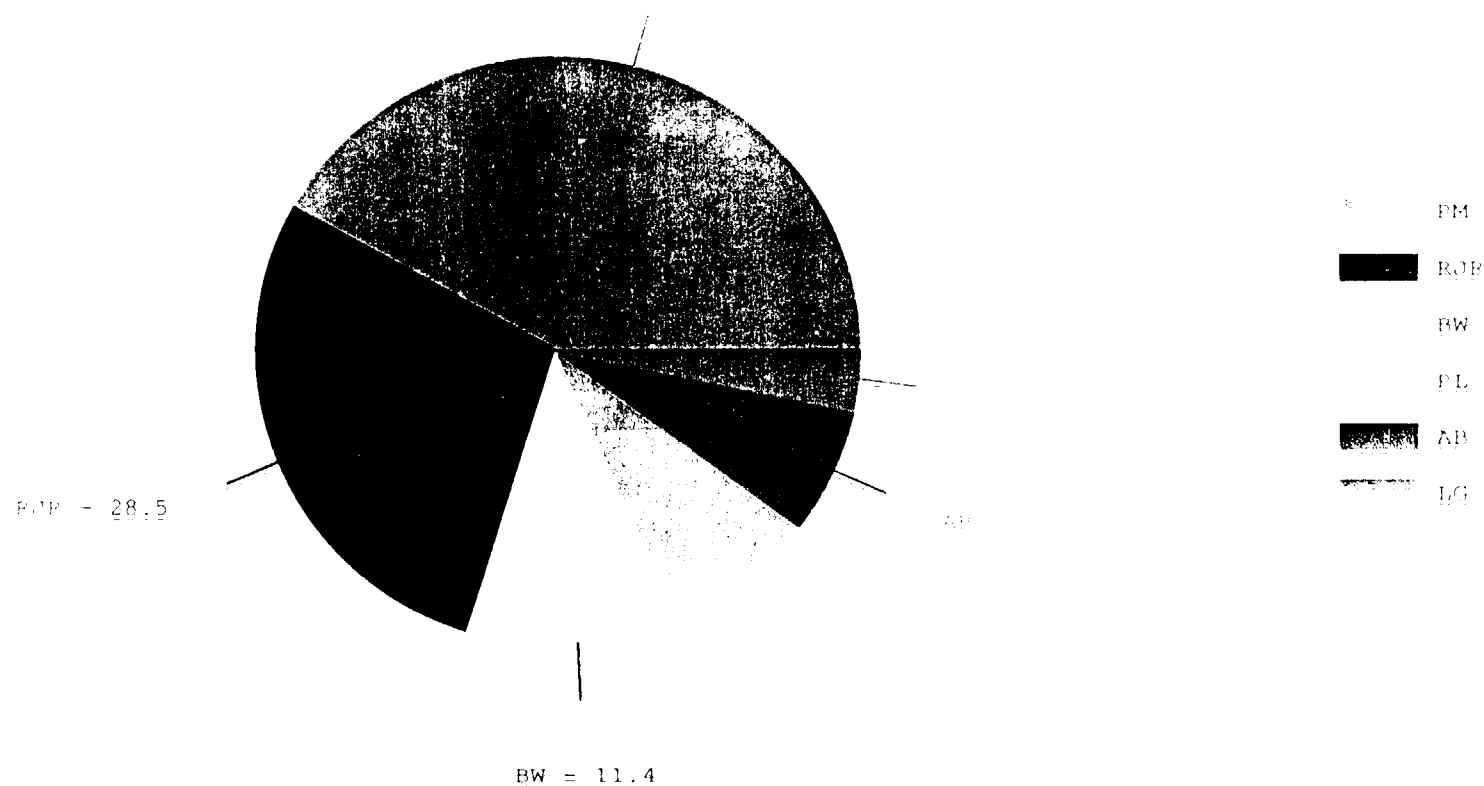
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APPENDIX J

Segmented Cigarette Market Trends

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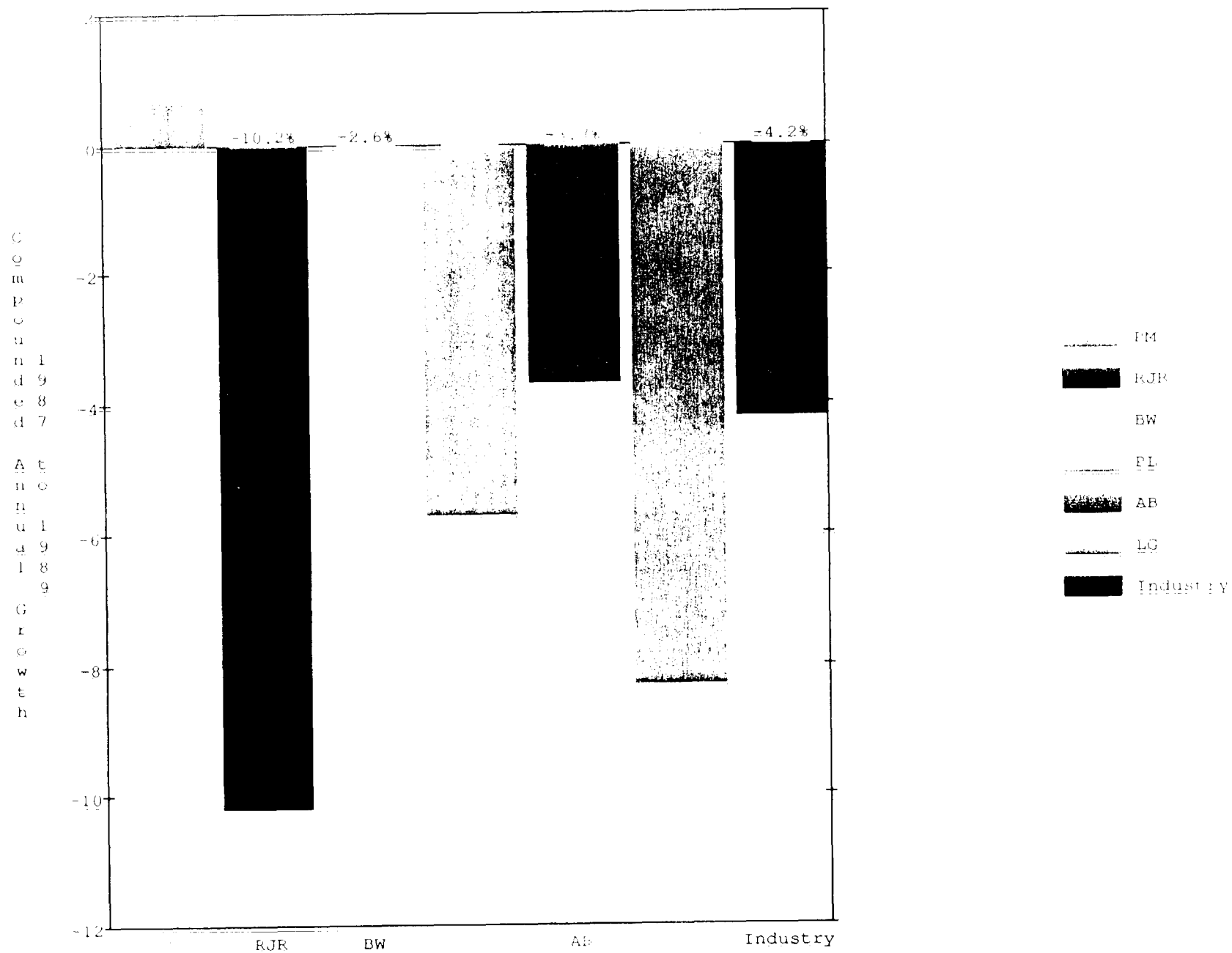
Total Domestic Market
1989 Market Share



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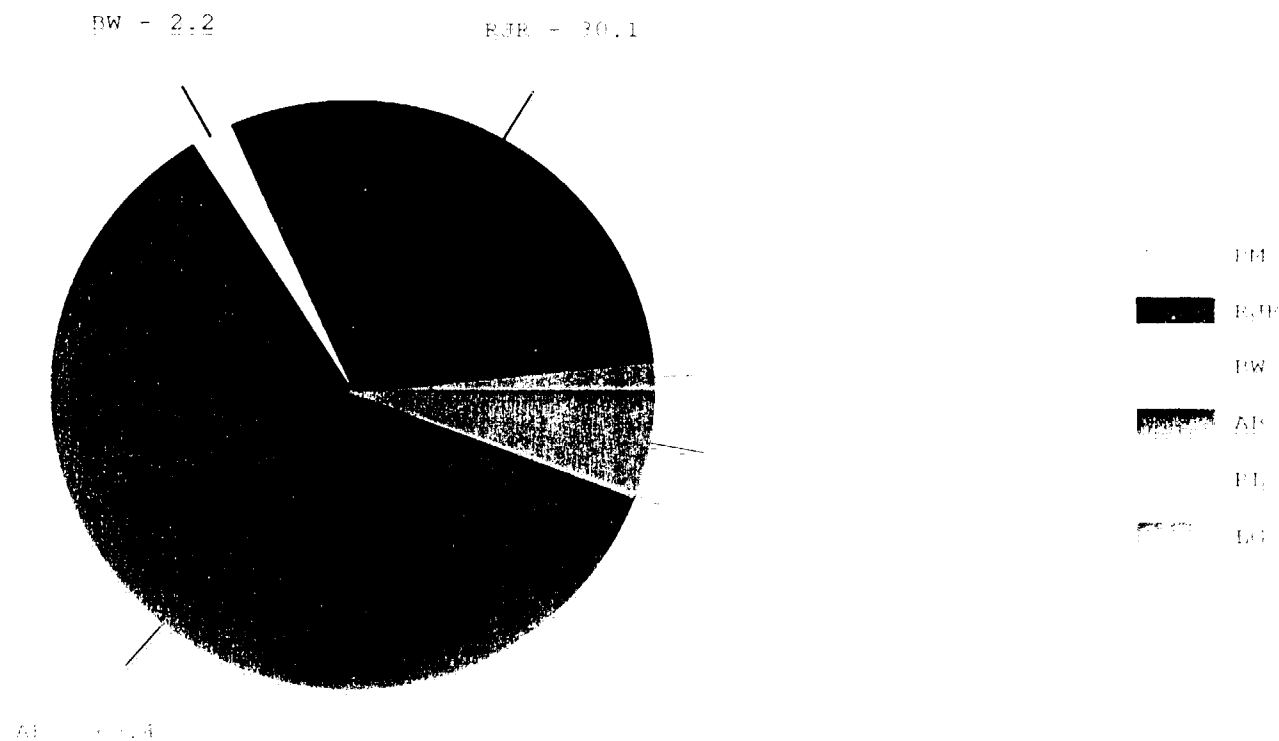
1989 Market Share
Total Volume = 523.9 Billion Units

Total Domestic Market



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Non-Filter Segment
1989 Market Share



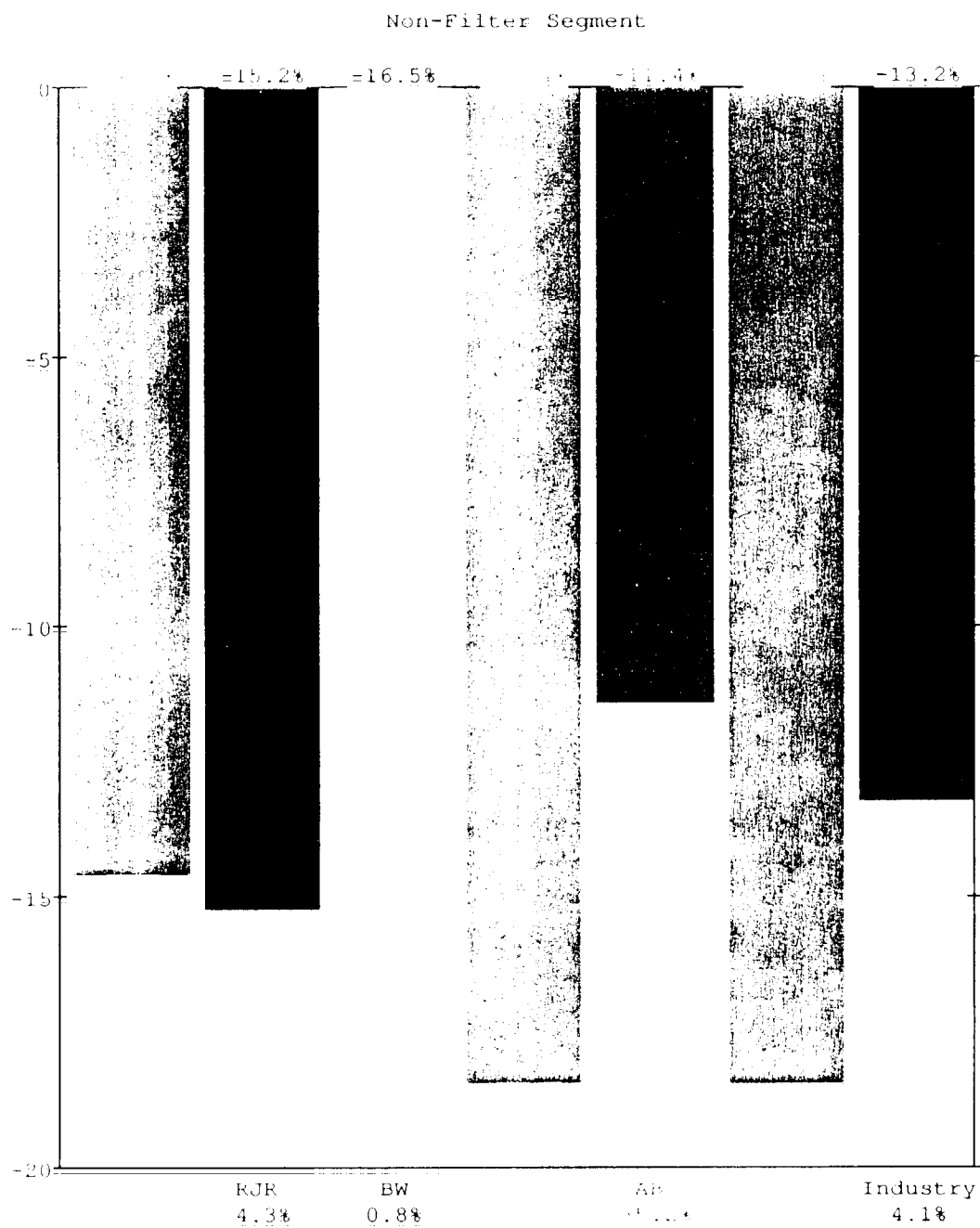
1989 Market Share (4.1%)
Pot. H. Volume = 21.3 Billion Units

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Compounded Annual Growth

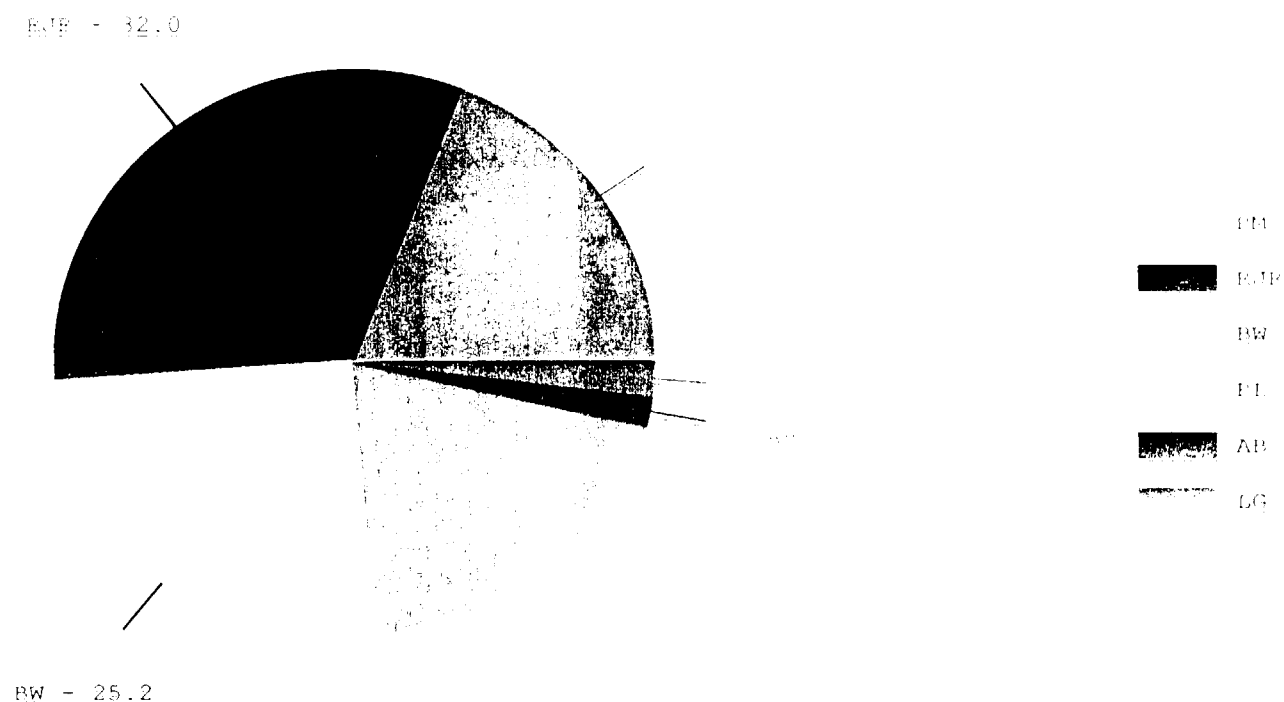
1981 to 1987



EM
EJP
BW
PL
AB
LG
Industry

* = Segment Volume / Company Volume

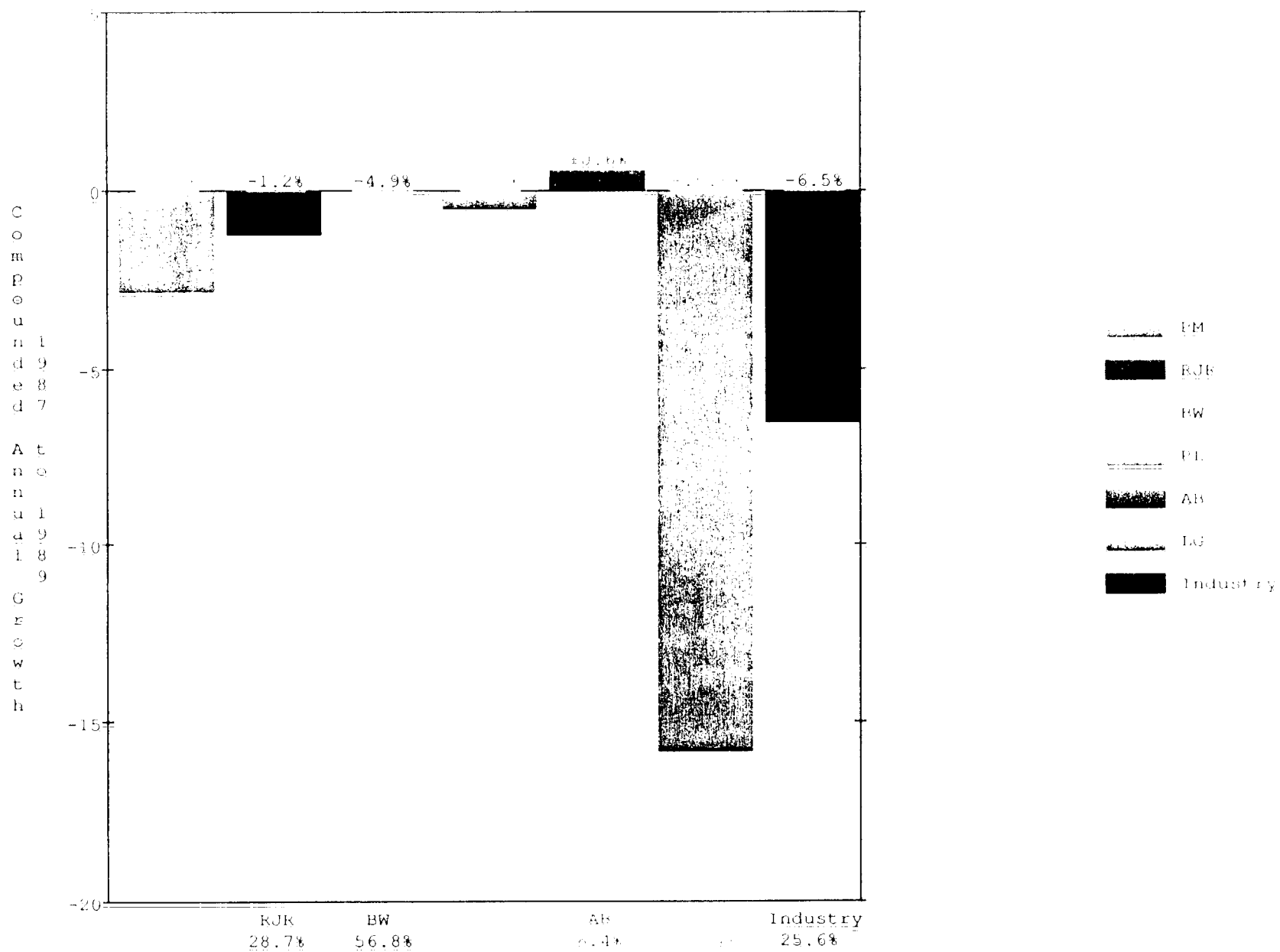
Menthol Segment
1989 Market Share



1989 Market Share (25.6%)
Total Volume = 134.0 Billion Units

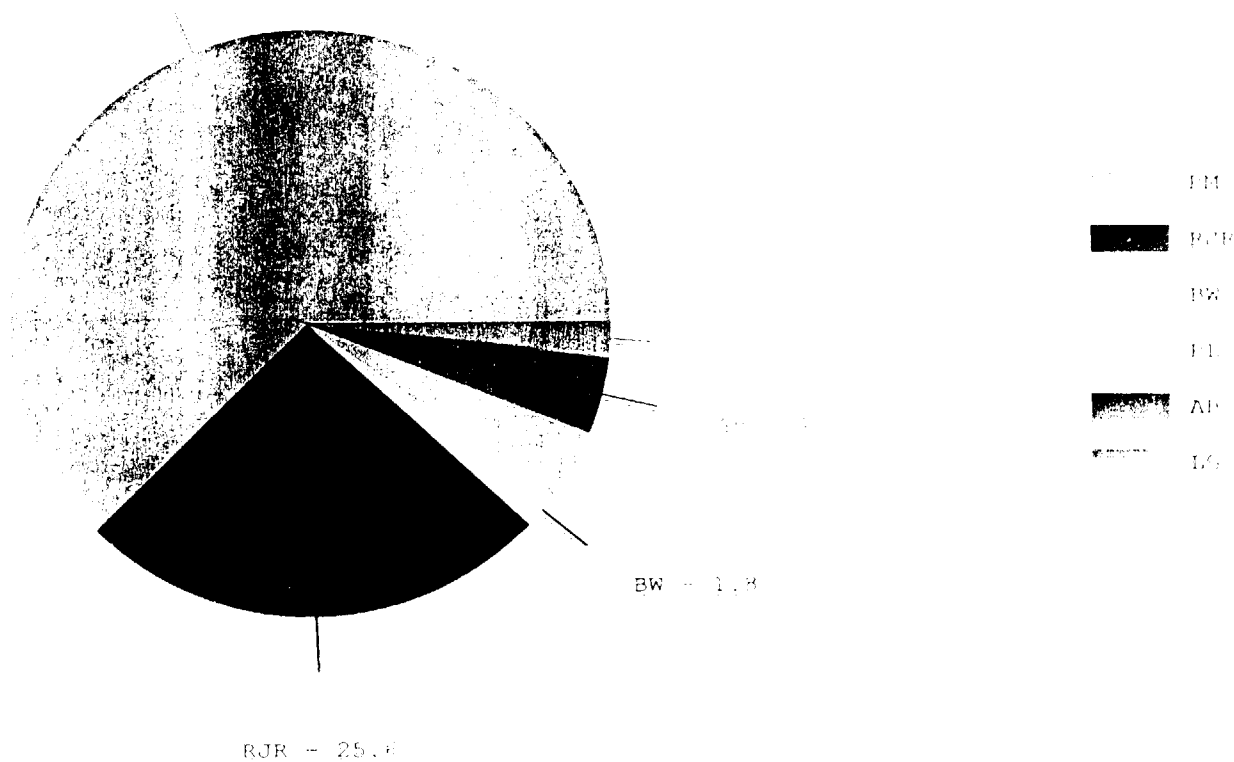
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Menthol Segment



* - Segment Volume / Company Volume

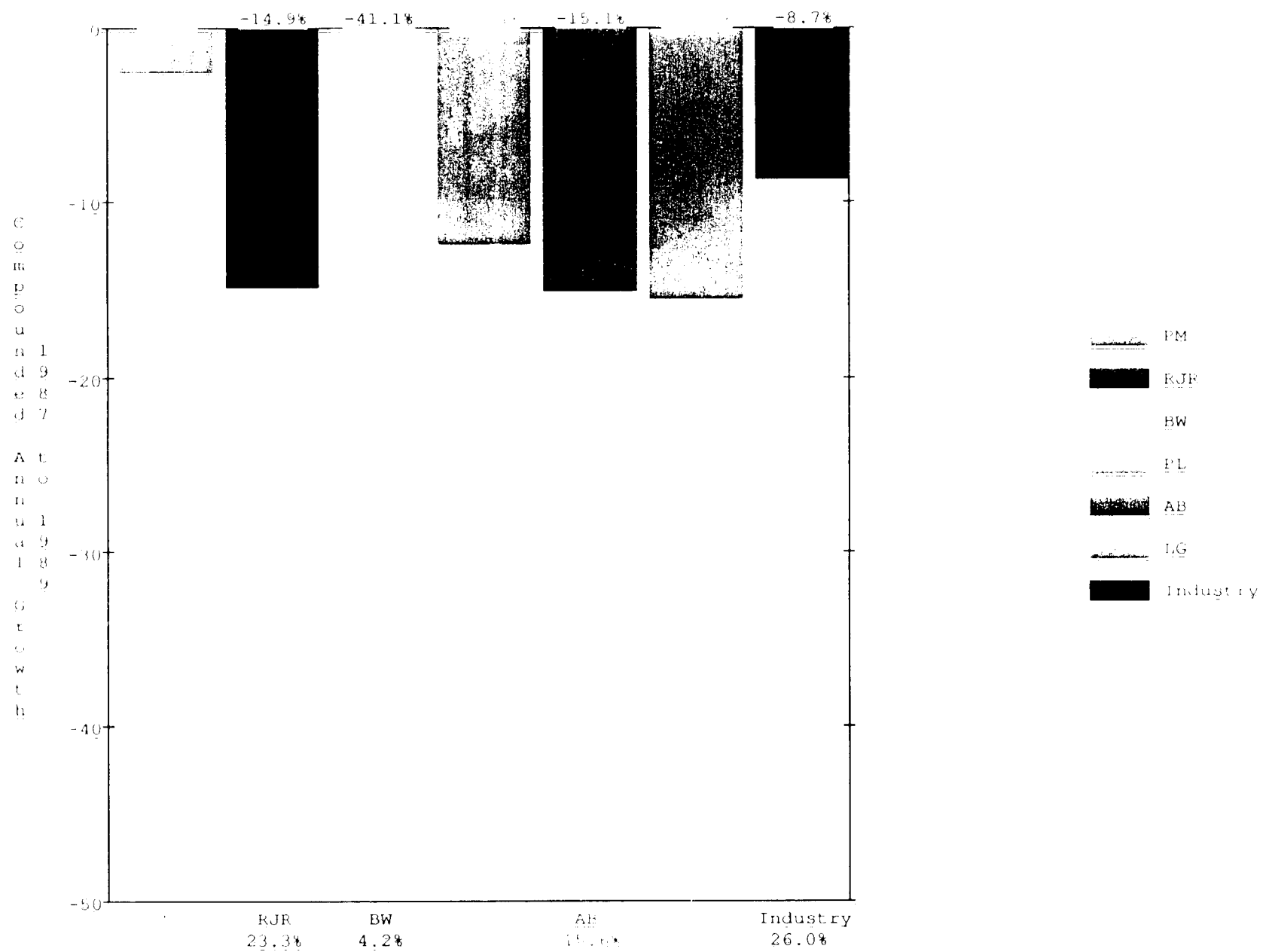
Full Flavored Filter Segment
1989 Market Share



1989 Market Share (26.0%)
Total Volume = 136.0 Billion Units

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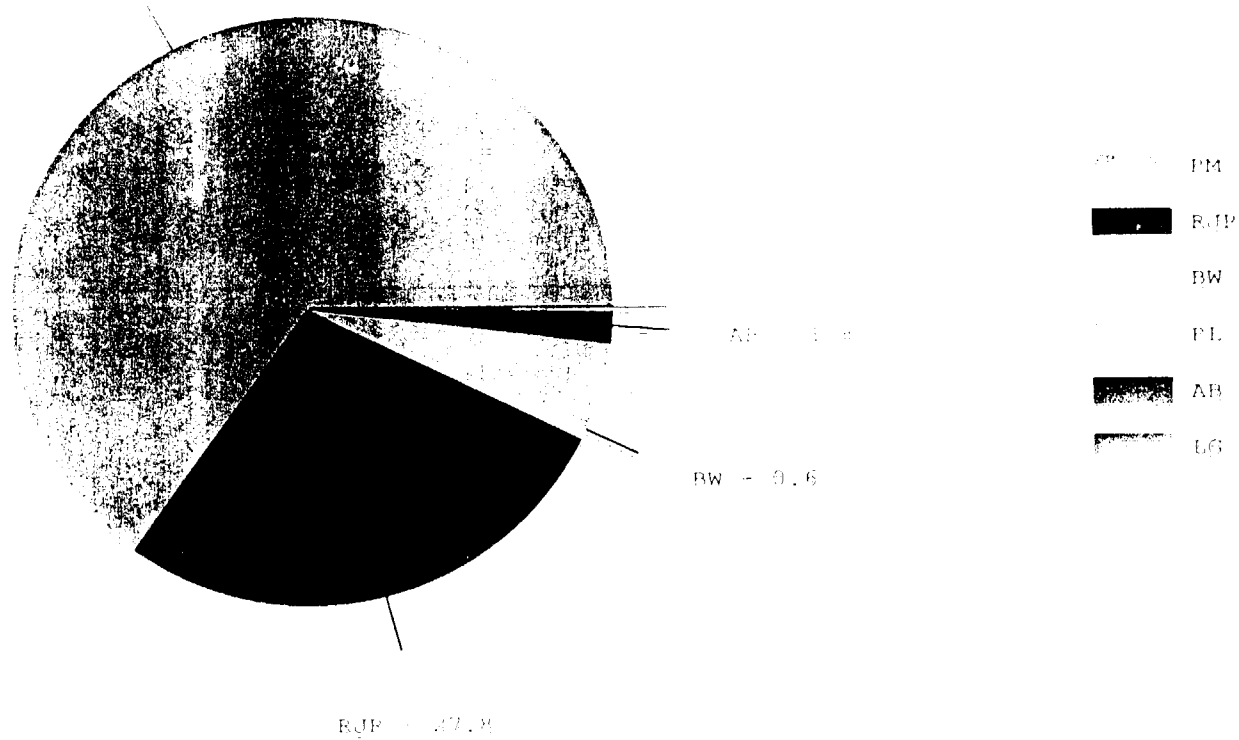
Full Flavored Filter Segment



% = Segment Volume / Company Volume

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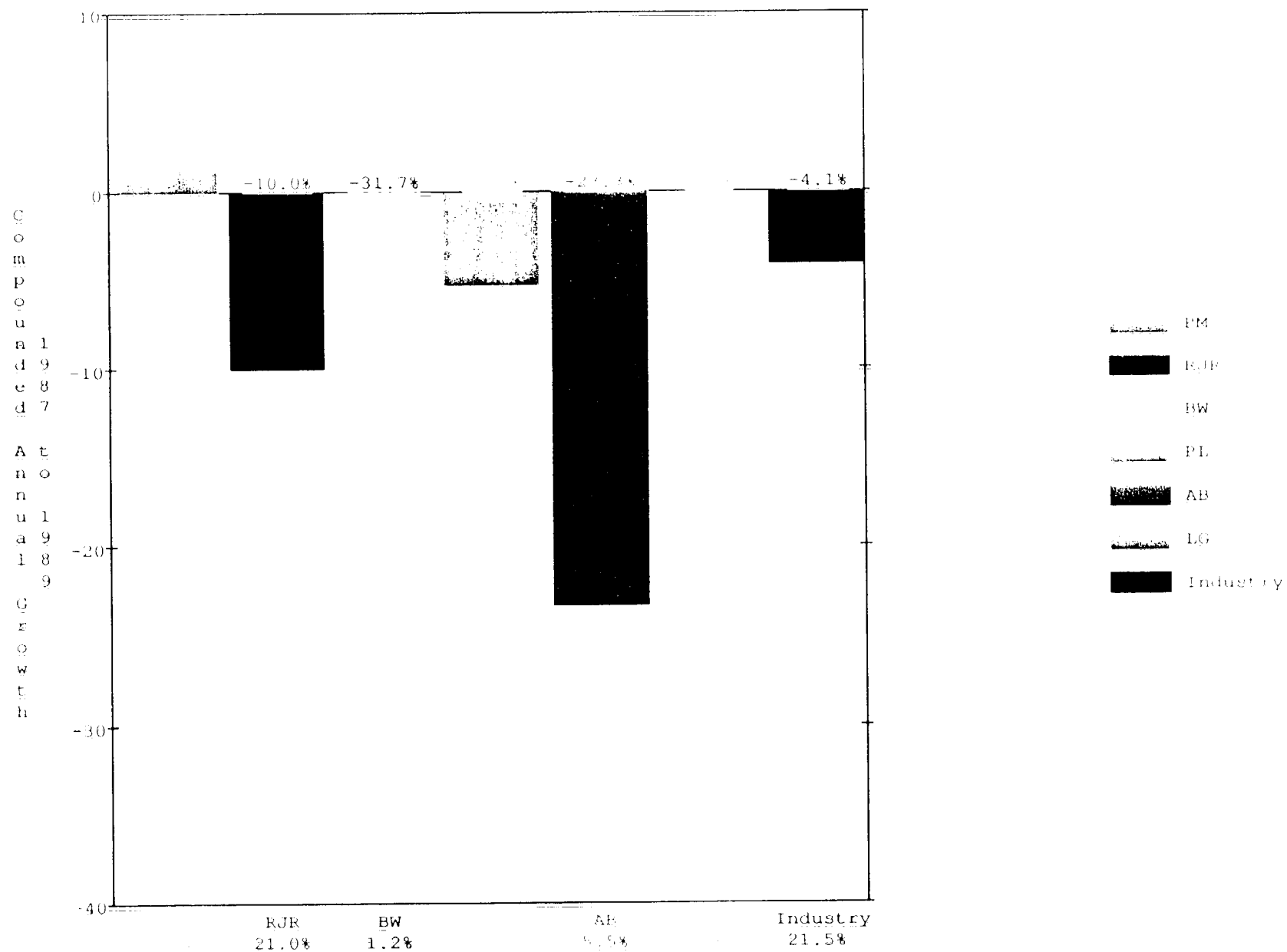
Light Filter Segment
1989 Market Share



1989 Market Share (21.5%)
Total Volume = 112.6 Billion Units

2026230508

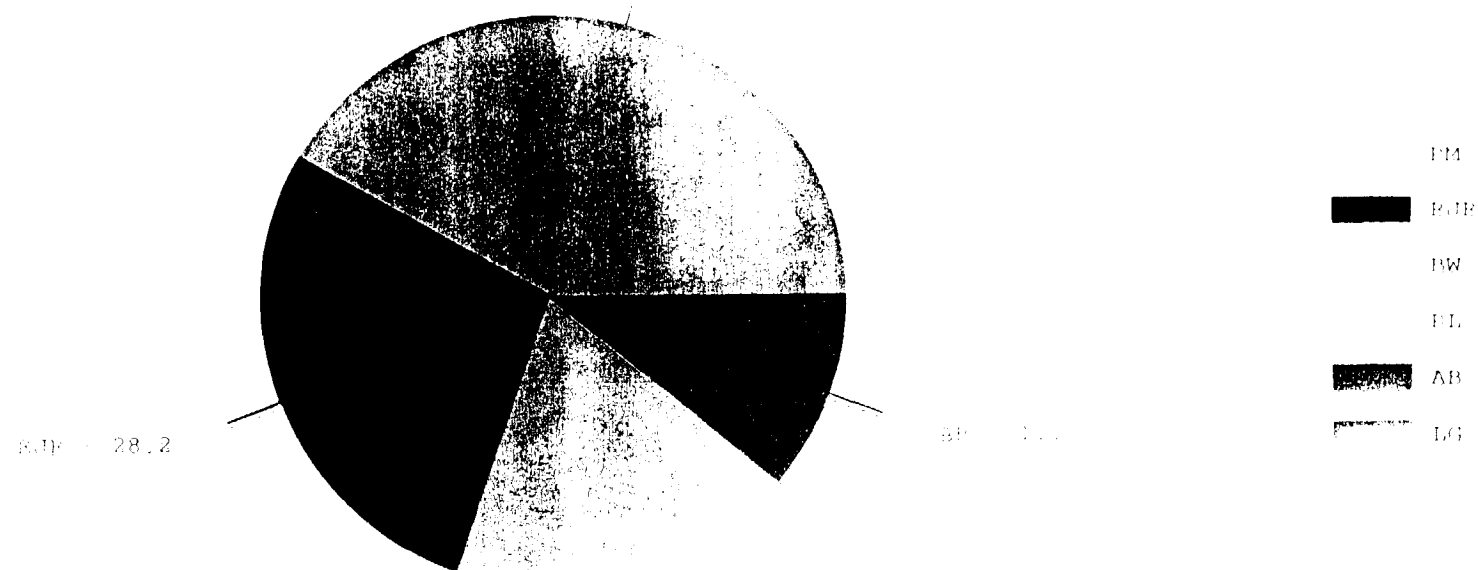
Light Filter Segment



% = Segment Volume / Company Volume

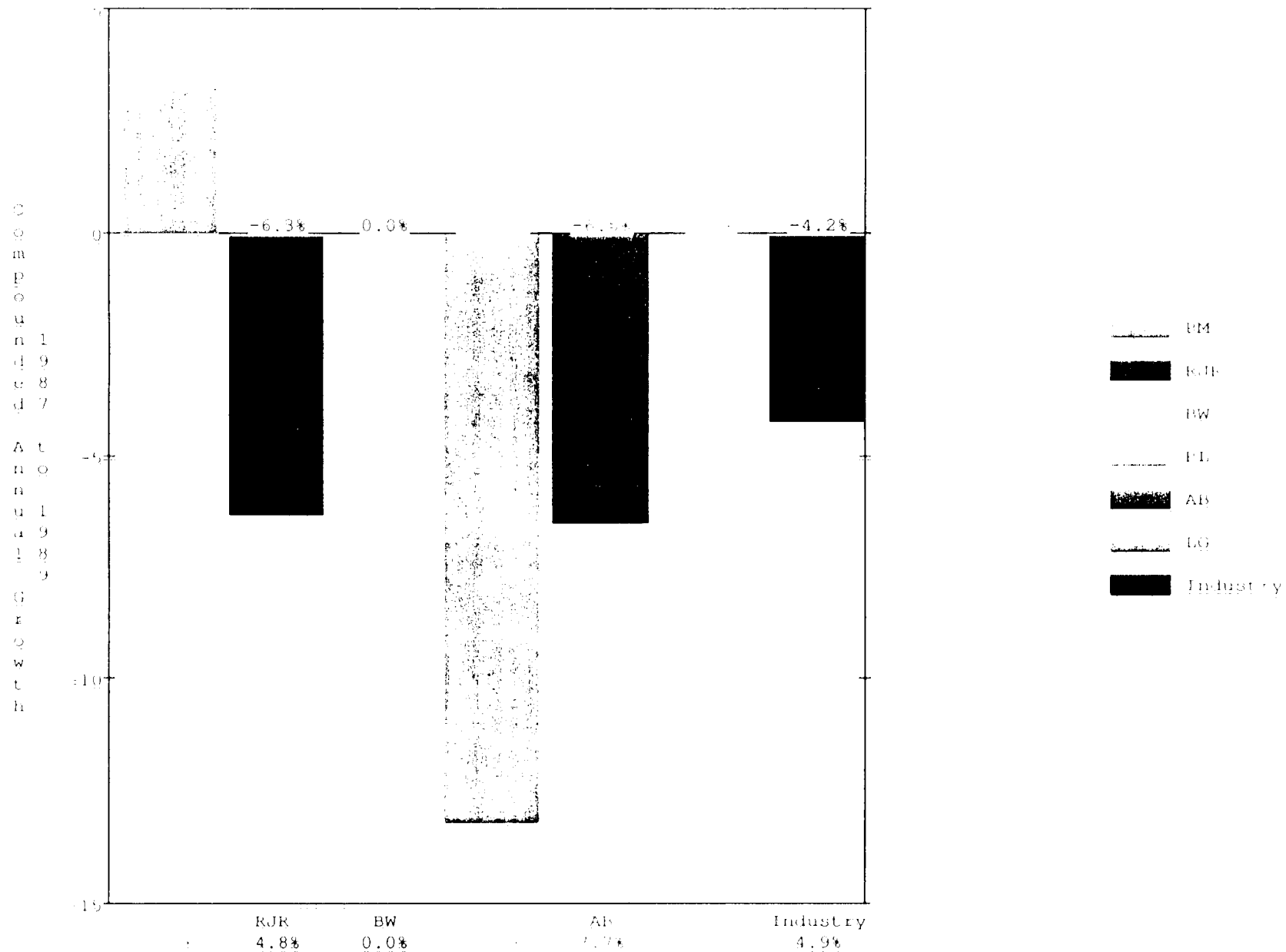
6050829202

Ultra Lights Filter Segment
1989 Market Share



1989 Market Share (4.9%)
Total Volume = 25.5 Billion Units
2026230510

Ultra Lights Filter Segment

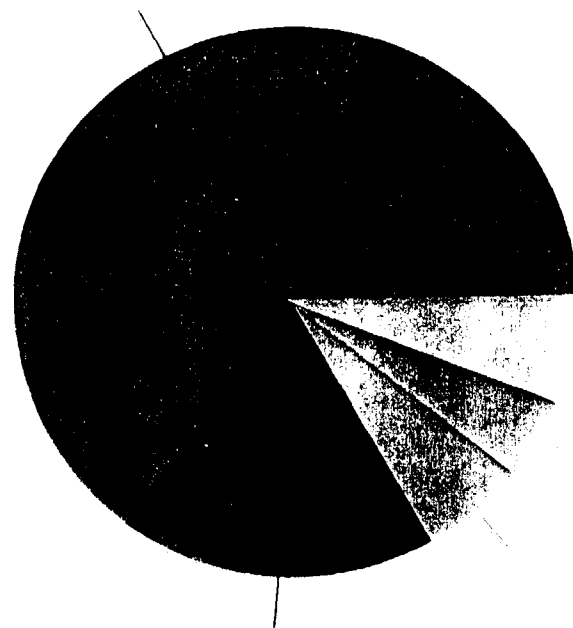


* = Segment Volume / Company Volume

2026230511

Price / Value by Type

1984 Market Share
Total Volume = 77.5 Billion Units



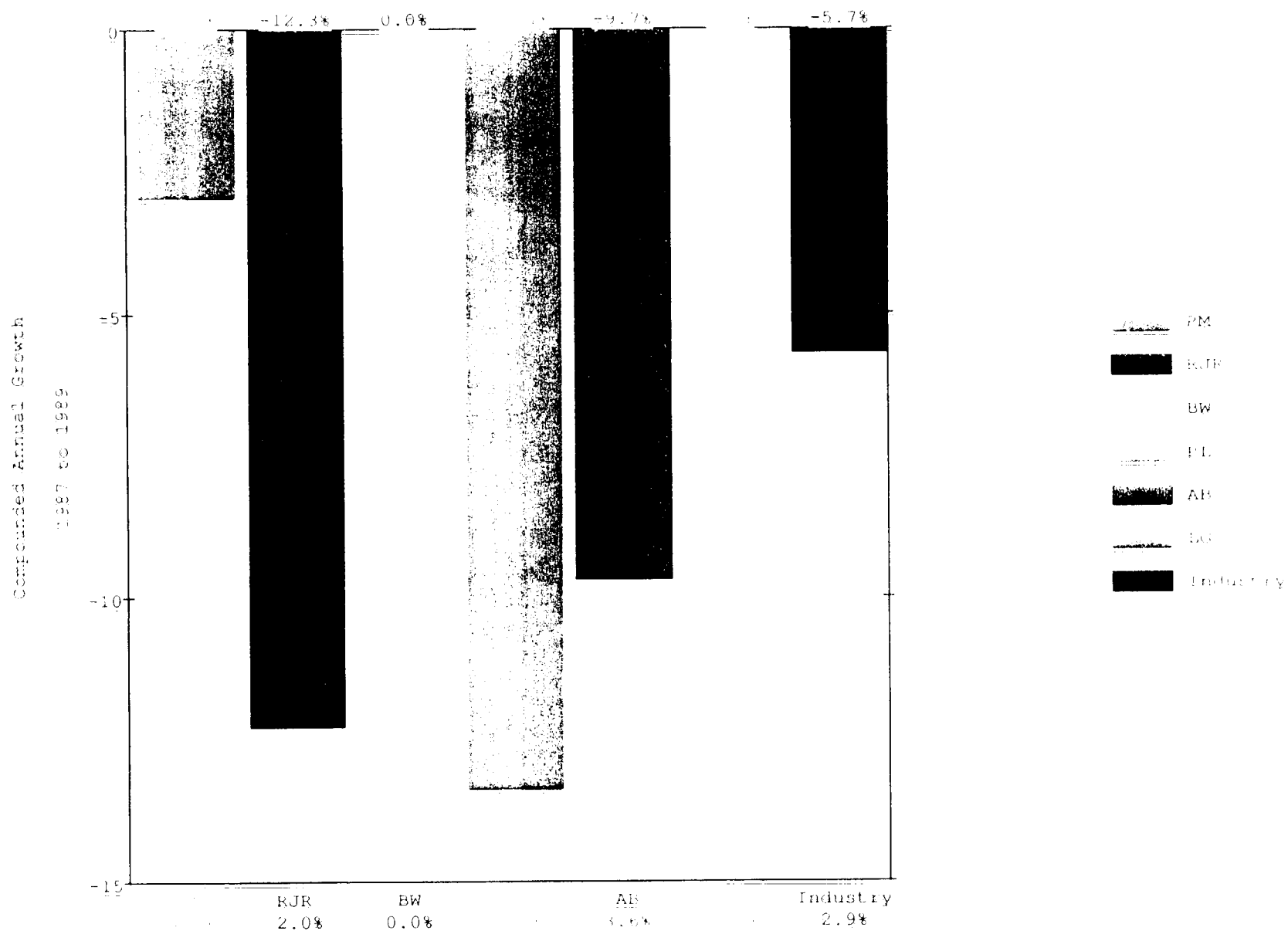
Branded Generics
Generics
Value 25's
Price Off
Sub-Generic (Third Tier)

Generics = 18.2

1984 Market Share (14.8%)
Total Volume = 77.5 Billion Units

2026230512

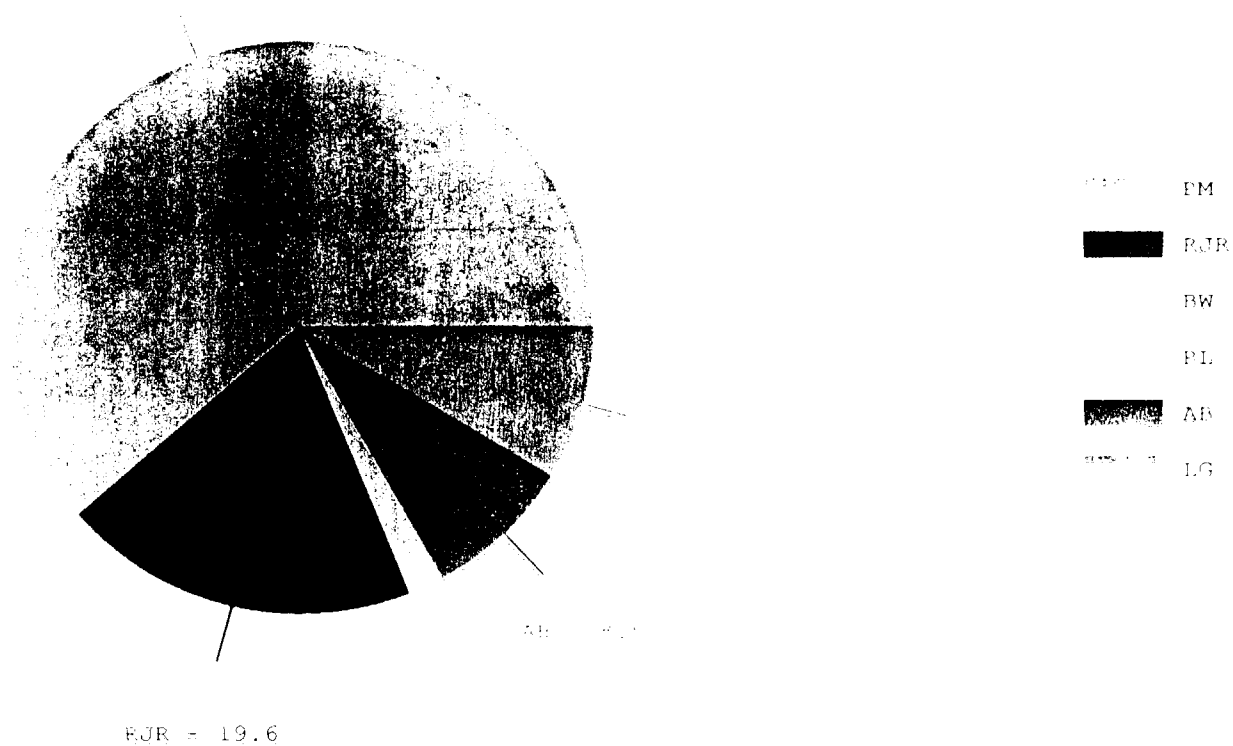
Slims / 120's Segment
1989 Market Share



Segment Volume / Company Volume

2026230513

Slims / 120's Segment
1989 Market Share



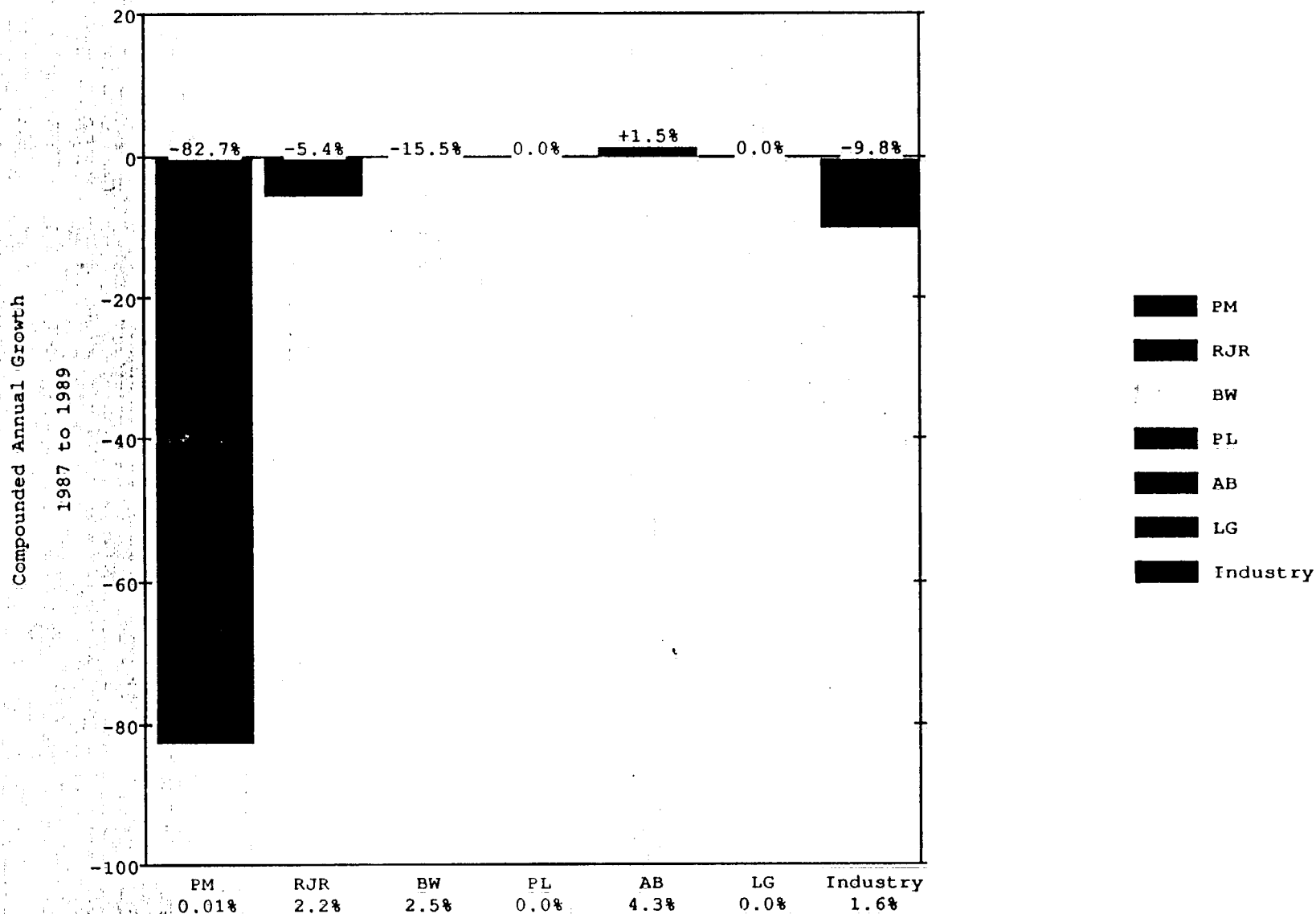
1989 Market Share (2.9%)

Total Volume = 15.3 Billion Units

2026230514

Ultra Low Tar Filter Segment

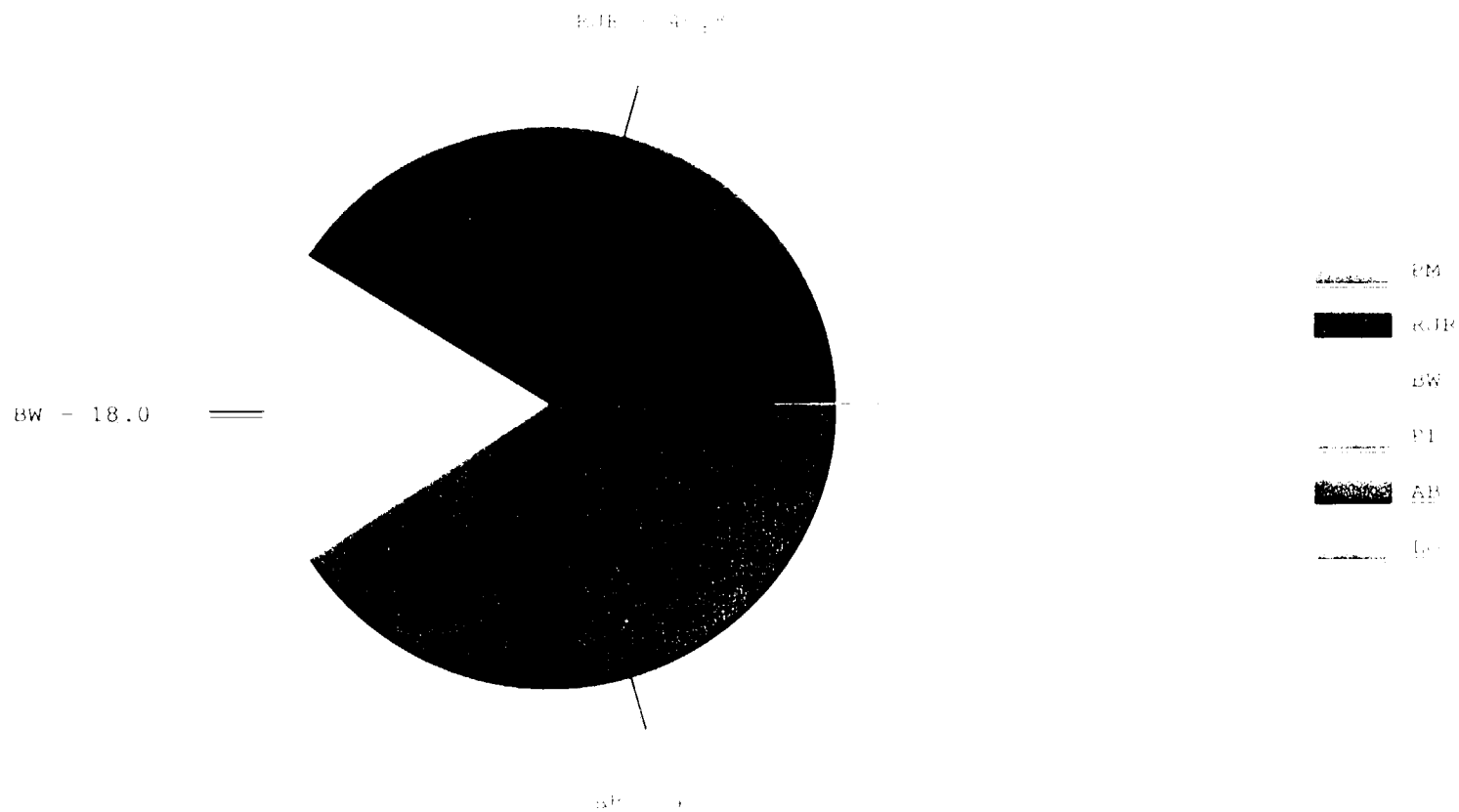
2026230515



% = Segment Volume / Company Volume

* Cambridge < 0.5 discontinued

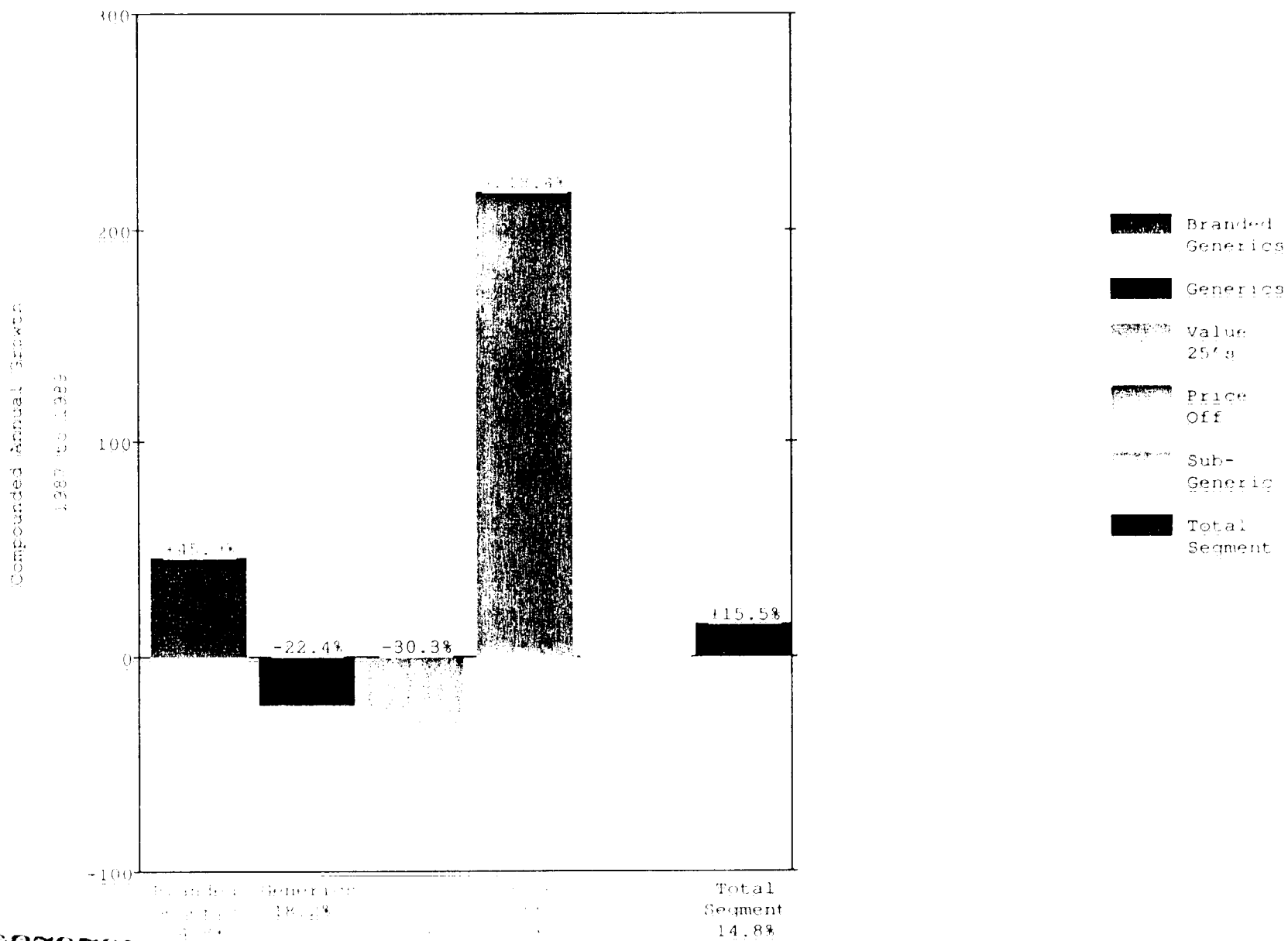
Ultra Low Tar Filter Segment
1989 Market Share



20202020202

1989 Market Share (1.6%)
Total Volume = 8.3 Billion Units

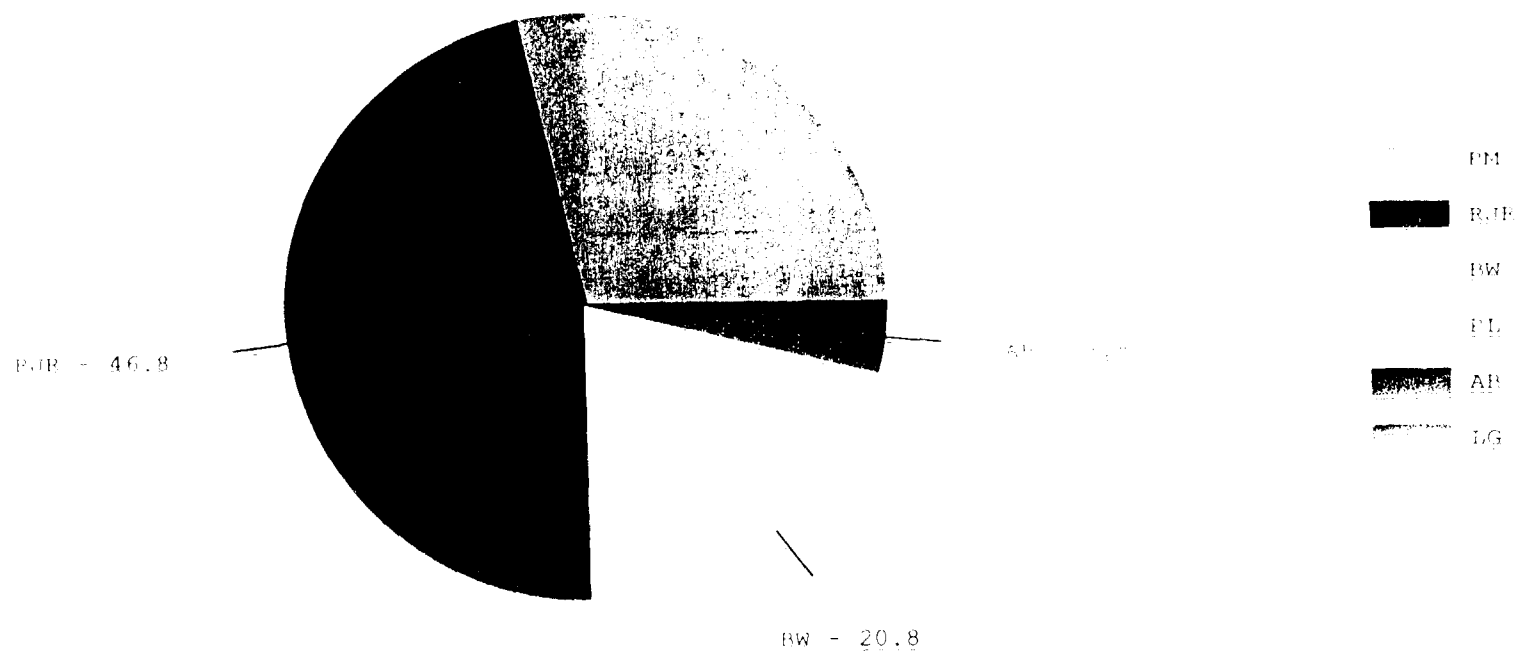
Price / Value by Type



2026230517

* Segment Volume / Company Volume

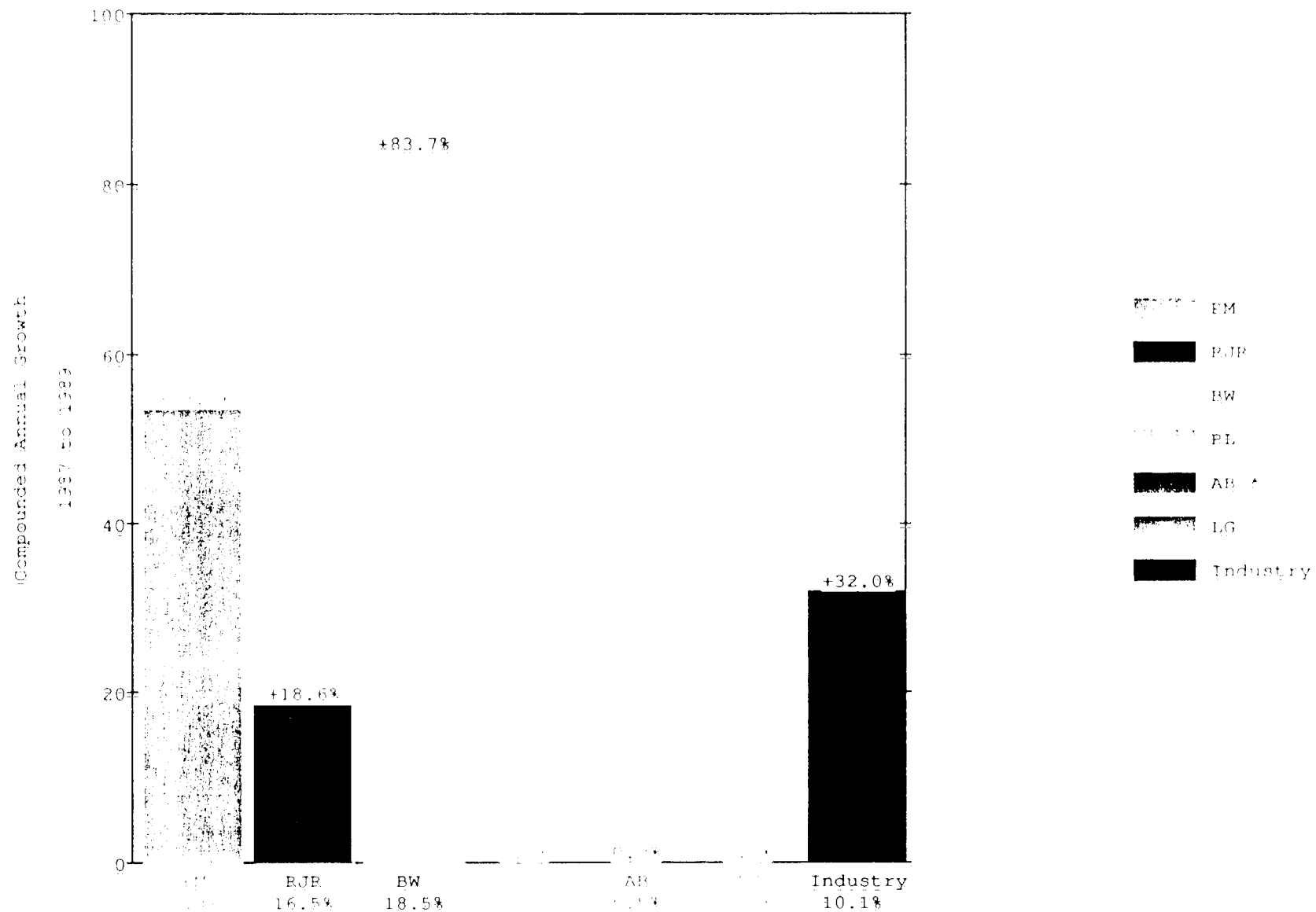
Branded Generics
1989 Market Share



1989 Market Share (10.1%)
Total Volume - 52.8 Billion Units

2026230518

Branded Generics



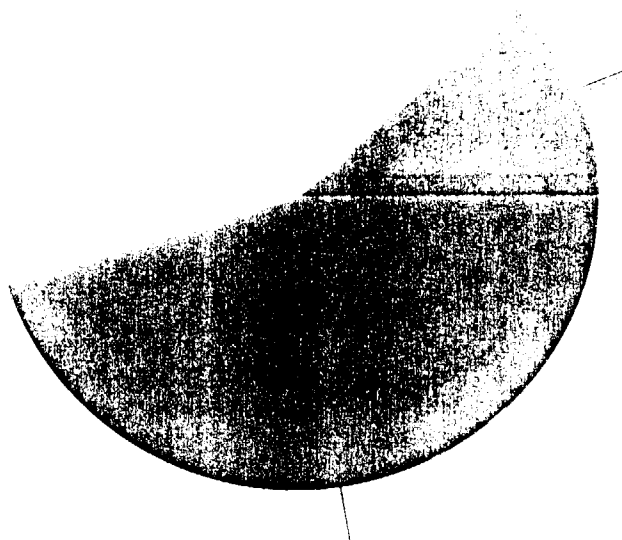
* - Segment Volume / Company Volume

* American Lights Introduced in 1988

2026230519

Generic Segment
1989 Market Share

BW - 42.8

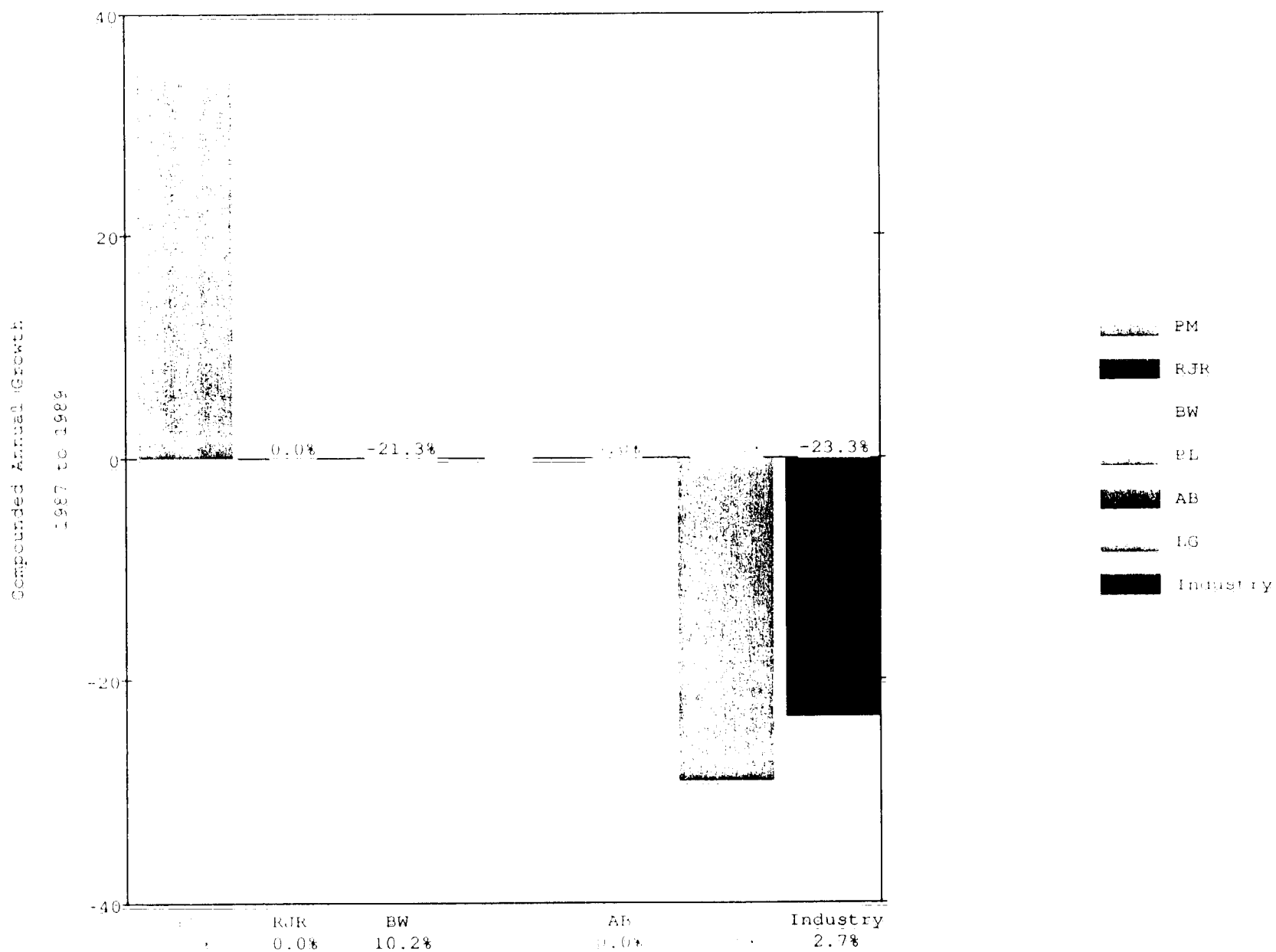


PM
KJR
BW
PL
AB
L

1989 Market Share (2.7%)
Total Volume = 14.1 Billion Units

2026230520

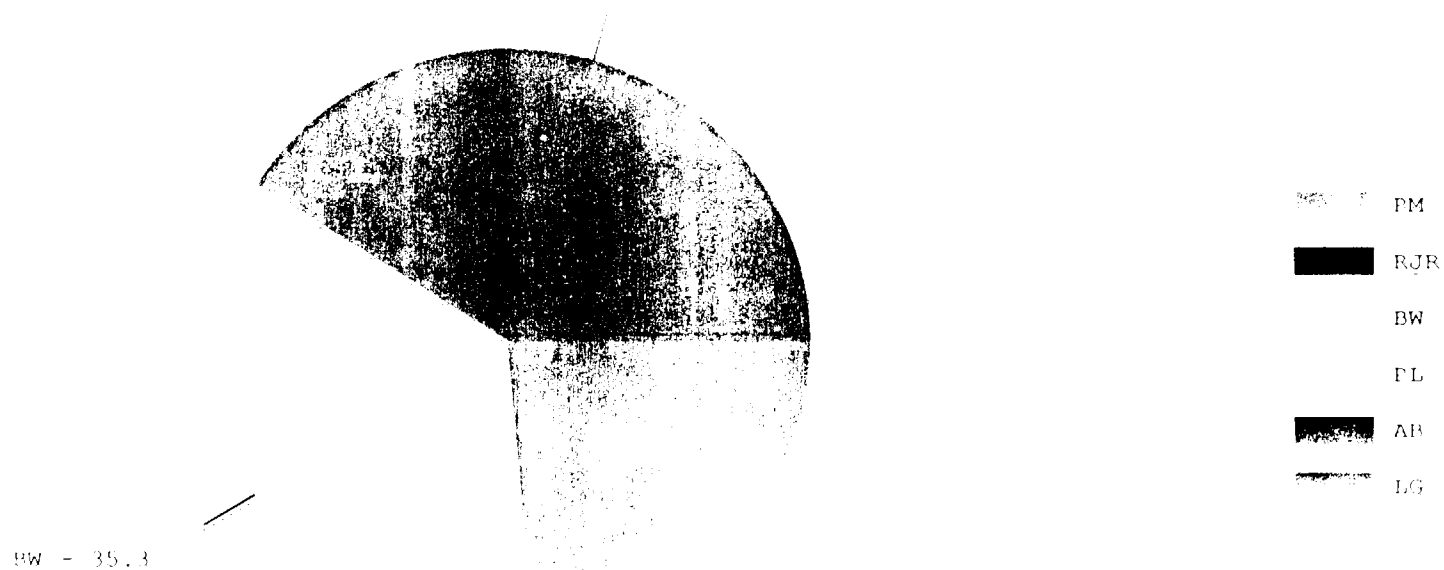
Generic Segment



* = Segment Volume / Company Volume

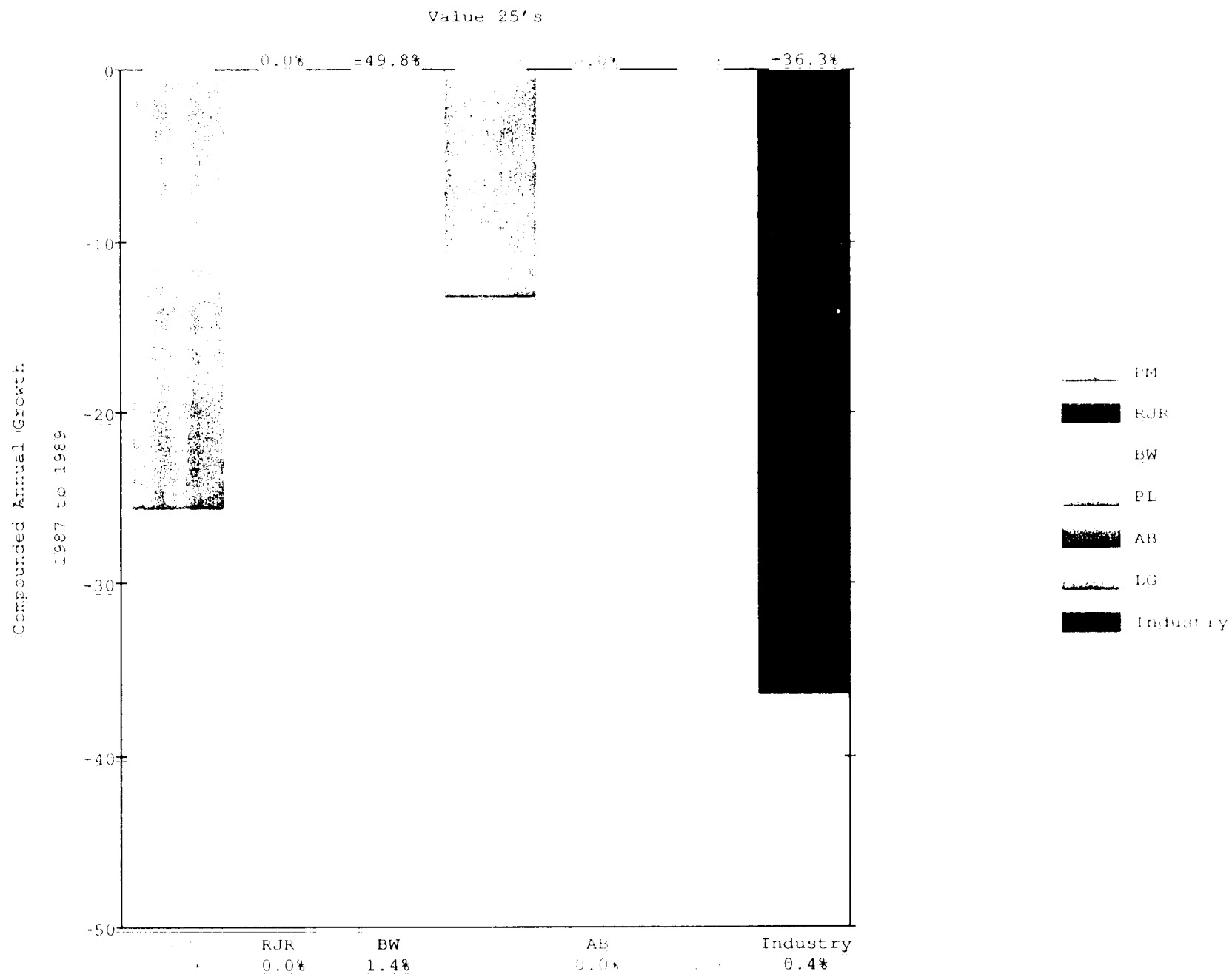
2026230521

Value 25's
1989 Market Share



1989 Market Share (0.4%)
Total Volume = 2.3 Billion Units

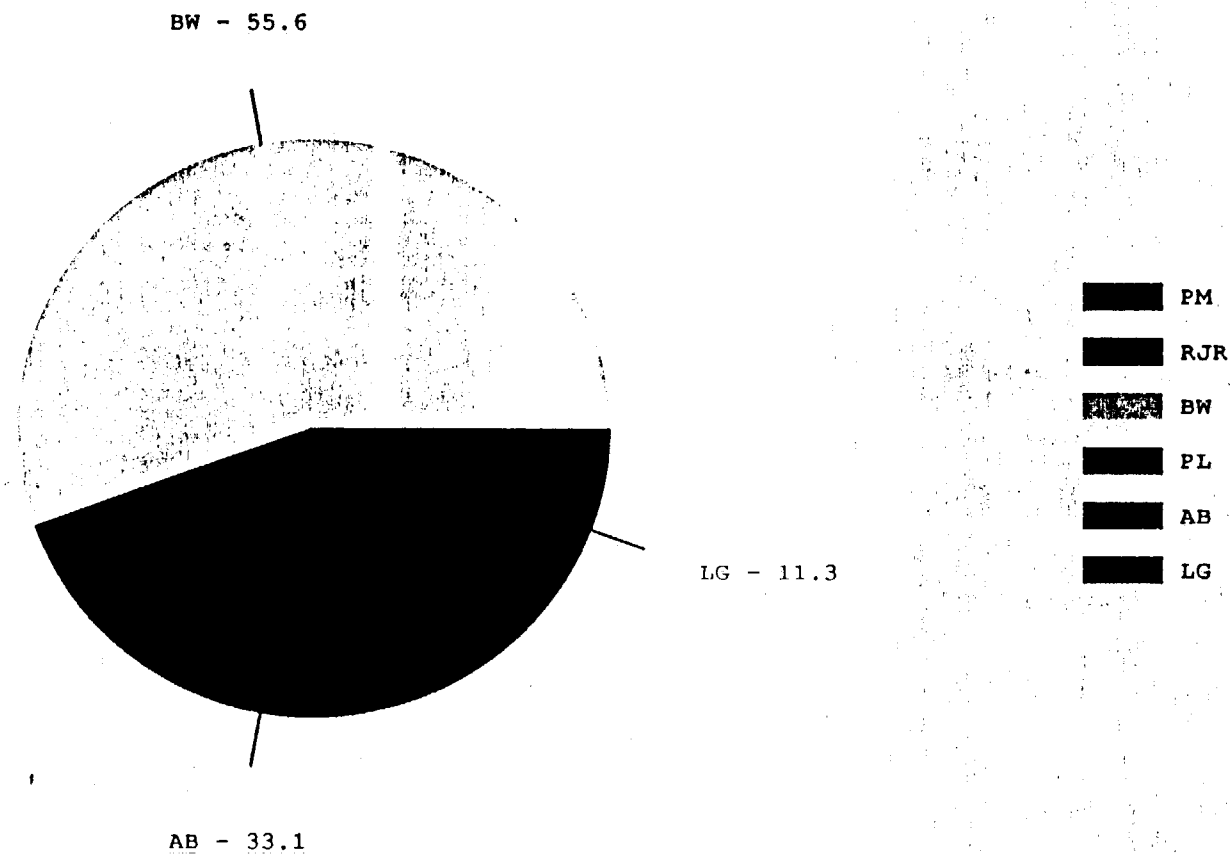
2026230522



* = Segment Volume / Company Volume

2026230523

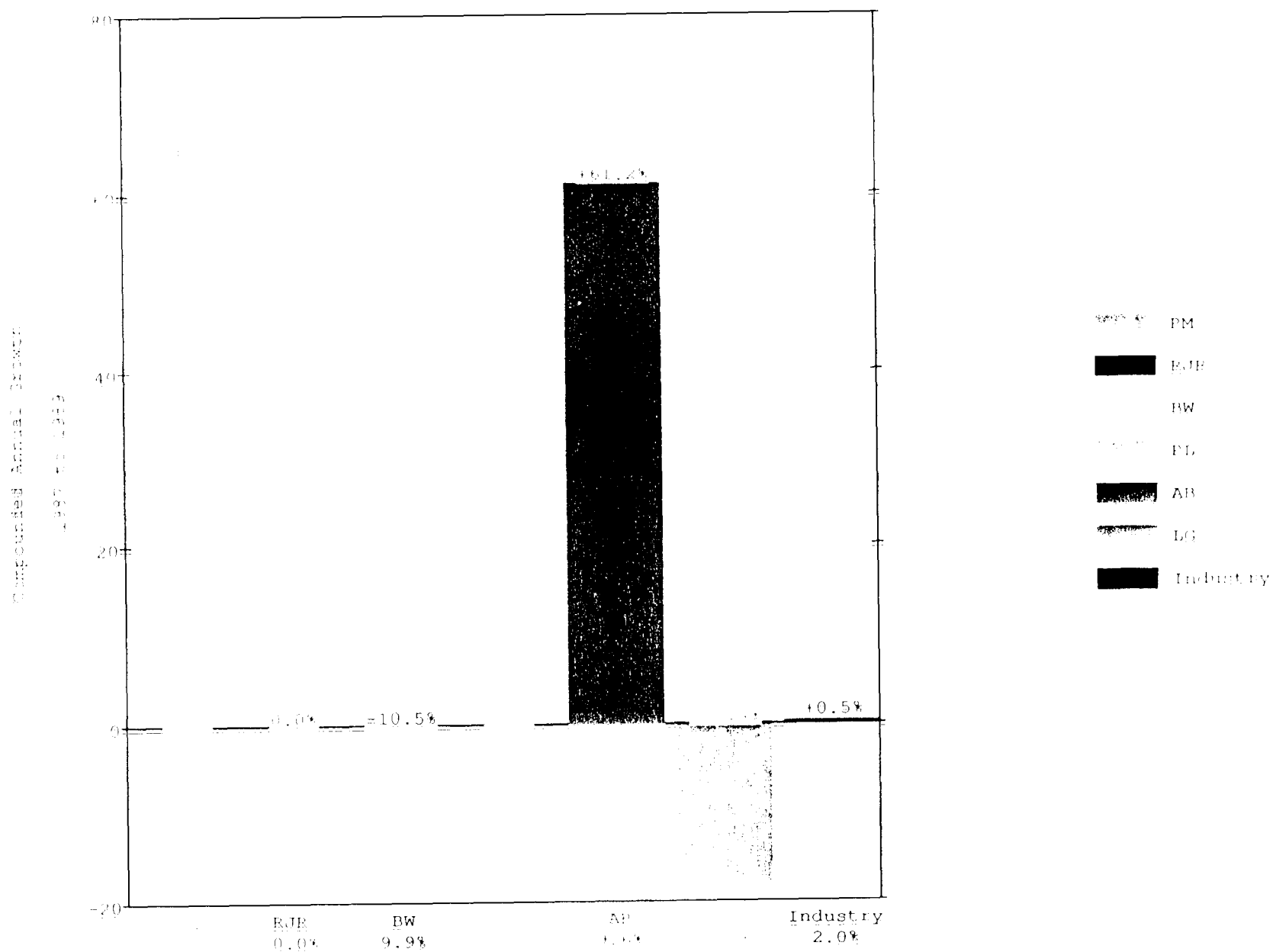
Price - Off (Coupon)
1989 Market Share



1989 Market Share (2.0%)
Total Volume = 10.6 Billion Units

2026230524

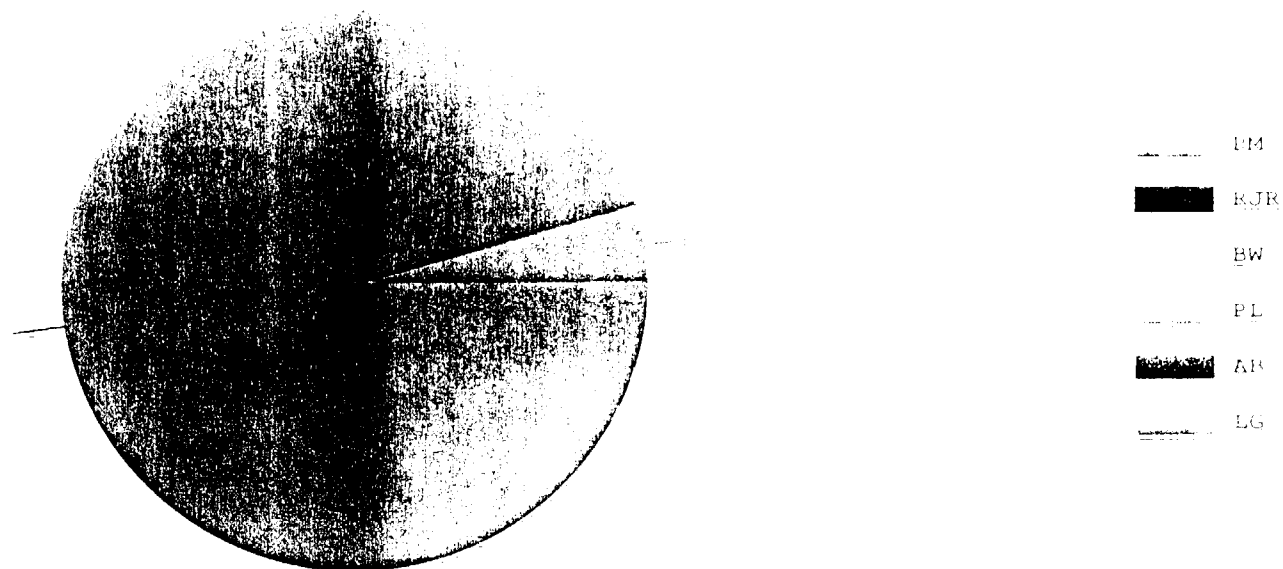
Price - Off (Coupon)



• Segment Volume / Company Volume

2026230525

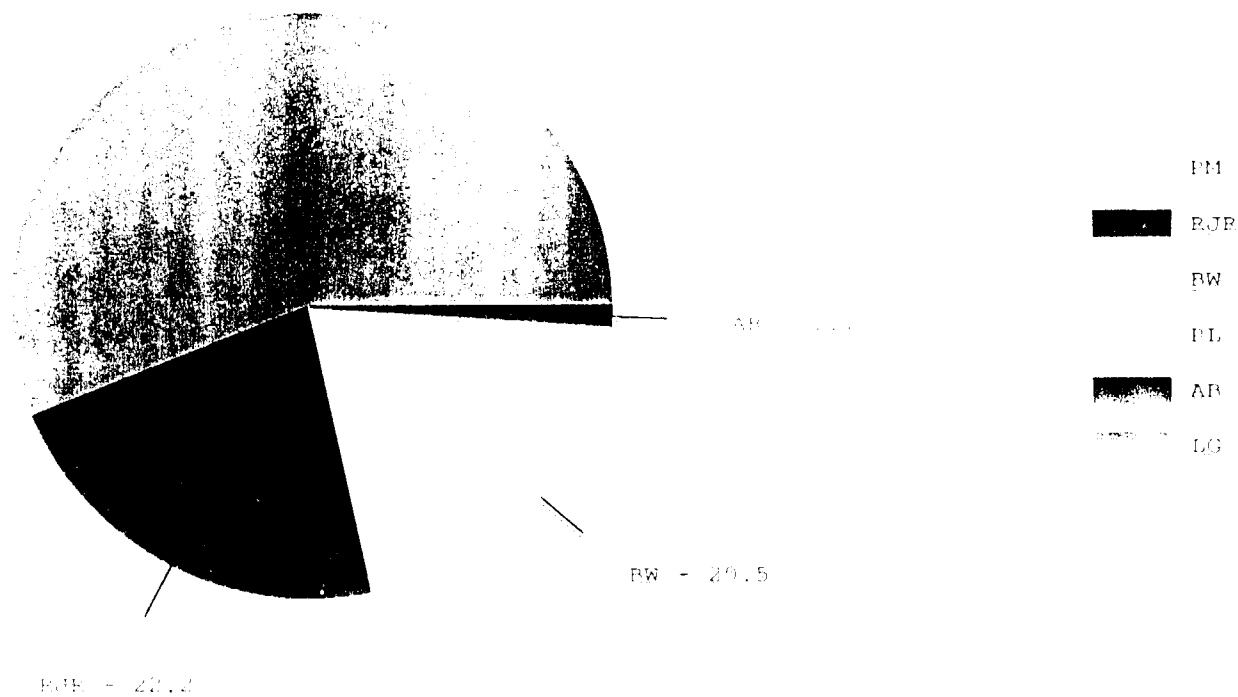
Sub - Generic
1989 Market Share



1989 Market Share (0.9%)
Total Volume = 4.7 Billion Units

2026230526

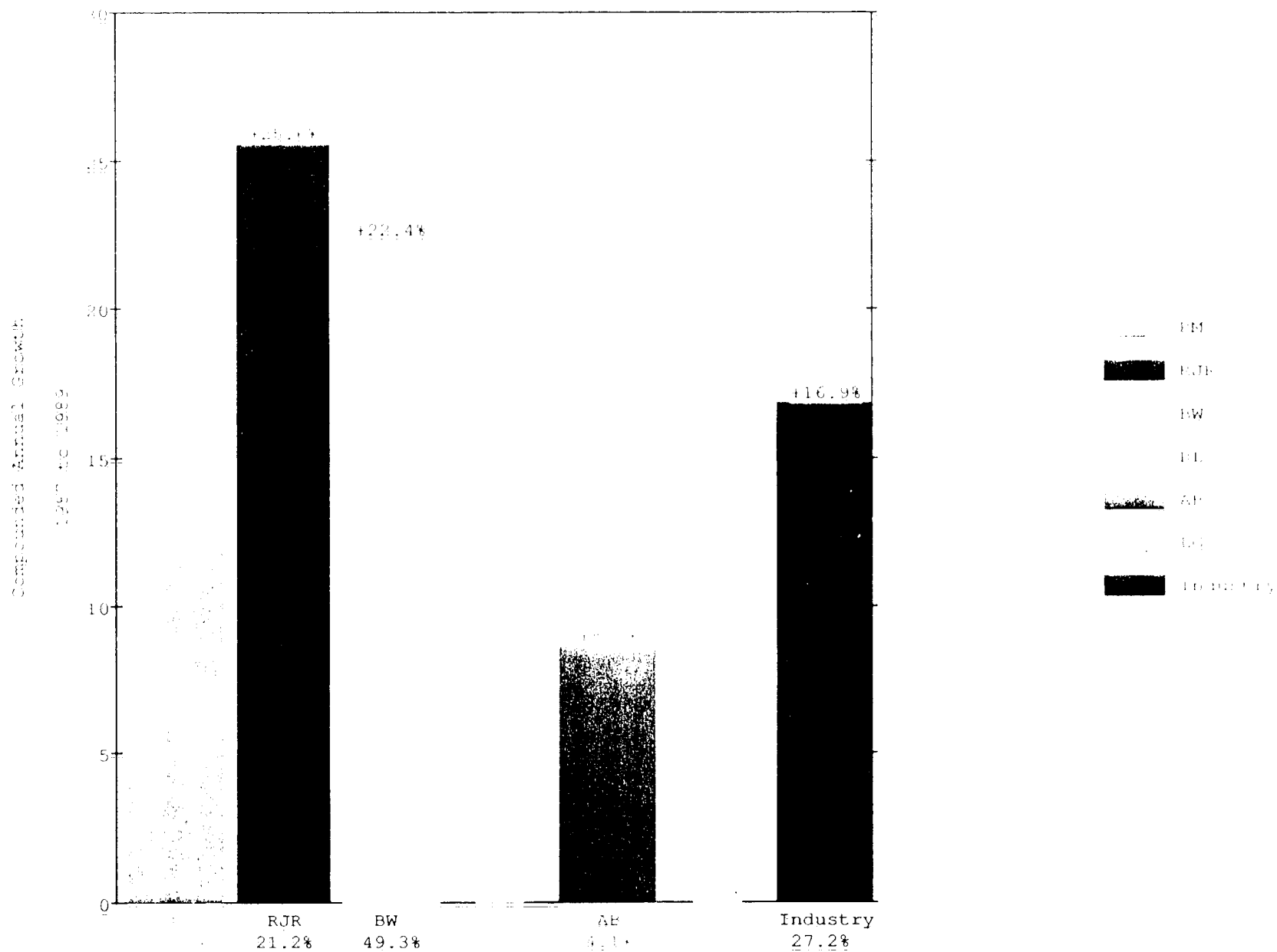
Export
1989 Market Share



1989 Export < Domestic (27.2%)
Total Volume = 142.7 Billion Units

2026230527

Export



$\% = \text{Segment Volume} / \text{Company Volume}$

2026230528

APPENDIX K

Response and Impact of Anti-Tobacco Legislation in Canada

2026230530

PHILIP MORRIS U. S. A.
INTER-OFFICE CORRESPONDENCE
Richmond, Virginia

To: Dr. E. B. Sanders Date: 1990 August 10
From: M. Z. DeBardleben
Subject: Industry Response to, and Impact of, Anti-Tobacco Legislation in Canada

There are only three cigarette manufacturers in Canada:

Imperial Tobacco Ltd.
RJR-Macdonald
Rothmans-Benson & Hedges

These companies explain the proliferation of anti-tobacco legislation in the country as a direct result of the wide publicity about the alleged effects of environmental tobacco smoke. Apparently Canadians are extremely environmentally conscious and have allowed these policies to encroach on their personal freedoms in the name of environmental protection. However, as early as last summer [Tobacco Reporter, August 1989] it was reported that "there are increasing signs that many Canadians. . .are beginning to react against this particular brand of extremism."

On the other hand, it appears that much of the credit for the anti-tobacco movement in Canada actually belongs to the combined forces of the Nonsmokers' Rights Association and the Canadian Cancer Society. These organizations have decided to play hardball with the tobacco industry, countering every move with their own strategic response. They carefully timed their press releases to coincide with actions by the industry, and their headlines were bold and provocative: WILL TOBACCO INDUSTRY DECEPTION OUTMUSCLE PARLIAMENT? or GANGRENE AND TOBACCO. They accused legislators of collusion with the industry, or of conflict of interest, by scheduling news conferences in the legislators' own districts and suggesting that their constituents question the integrity of their elected representatives. They retained Canada's most prestigious law firm to deliver an opinion on the personal liability of tobacco company executives for failing to warn the public that cigarettes are lethal and addictive. When that opinion stated that, according to Canadian tort, charges of criminal negligence could be filed against the executives, the organizations stood mute for nine months until the day when the tobacco industry was making its case against the proposed Tobacco Products Control Act before the House of Commons. The news headlines then screamed: JAIL TOBACCO BOSSES, GROUP SAYS!

2026230531

The two societies state that their key to success was "the recognition of the hopelessness of the traditional strategies, such as trying to fight the plague of tobacco-induced diseases with sweet reason, gentle persuasion, and endless fund-raising for biological research." [The Washington Monthly, July-August 1990]. They instead used advertising and public relations to win the support of the man in the street and lobbying to make allies of the legislators and publishers. The lesson they have taught the world is: "Politicians are sure to hear you when you take your case to the public." Or to put it another way, Kenneth Kyle, a Canadian Cancer Society lobbyist, asked: "Why spend millions on microbiologists and not on lawyers, if the lawyers will be more effective in fighting the tobacco epidemic?" After the passage of the Tobacco Products Control Act, William Neville, the primary lobbyist for the tobacco industry, "grudgingly" revealed what the Canadian antismoking lobby had done: "Clearly one of the . . . successes of the antitobacco lobby was to make this appear to be a health issue, and when that happens that is a difficult area for the industry."

As early as 1984 the Nonsmokers' Rights Association showed its steel when it lost its campaign to prevent the sponsorship of the Canadian Ski Association's team in the national championships by RJR-Macdonald (Export A brand). So much media attention was paid to this issue that the health minister and the minister of fitness and amateur sport adopted a policy whereby for every dollar national sports bodies receive from the tobacco industry they will lose an equal amount from their federal funding.

By the winter of 1987 an extensive campaign to convince leading newspapers to reject tobacco advertisements had resulted in success among five major Ontario dailies, accounting for 20% of the circulation throughout all of Canada. These were shortly joined by The London Free Press and Montreal's Gazette, the former widely read in the tobacco-growing areas of the country and the latter being the largest daily in Eastern Canada. By way of comparison, only eleven American newspapers, mostly small dailies representing 0.6% of daily circulation, have adopted such a policy.

We have looked at the 1988-1990 press relevant to the Canadian situation and can identify the following pieces of legislation. Their passage was given the ultimate boost when the Nonsmokers' Rights Association, using its uncanny timing, began 1988 with an advertisement in Canada's most influential newspaper, The Globe and Mail, featuring a photograph of two friends who would rather have kept their relationship secret: Brian Mulroney, the prime minister, and William Neville, president of the Canadian Tobacco Manufacturers' Council.

Legislation

7/88 Tobacco Products Control Act (a single violation carrying a fine of up to \$250,000), to be implemented as follows:

1/89 All tobacco advertisement banned from magazines, newspapers, radio, and television (radio and television advertising was voluntarily withdrawn by the manufacturers in 1971); no advertising of Canadian tobacco products in foreign magazines sold in Canada; all tobacco sponsorships must be held under the corporate rather than the brand name of a tobacco product; rebates on tobacco products illegal; no new in-store advertisements; distribution of free samples prohibited; use of tobacco brand names on nontobacco items (mugs, hats, shirts) prohibited

Company defenses against smokers' lawsuits were weakened by disallowing the use of government warnings as a shield from liability "if the companies had known of but failed to disclose particular additional health hazards relevant to the litigation"

1/91 All tobacco advertisements on billboards banned

1/93 All tobacco advertisements in retail stores, including brand-related materials, banned

1/89 164% increase in federal taxes on cigarettes over 1/85 (plus additional provincial taxes)

1/89 Non-smokers' Rights Act, involving:

All smoking banned in federal workplaces; tobacco put under the Hazardous Products Act; smoking severely restricted in buses and other forms of public transportation; except for designated areas, all smoking prohibited in federally regulated workplaces (banks, broadcasting studios, government agencies)

7/89 Employers required to set aside 75% of space in offices and factories as non-smoking areas

Health warnings must be at the top of billboards and must occupy at least 20% of the space (for billboards erected after this date)

8/89 Smoking prohibited by House of Commons staff and visitors (but not by members of Parliament or their staff)

10/89 Tax increase on fine-cut tobacco for roll-your-own cigarettes

11/89 Unattributed health warnings (4 rotating messages) must cover at least 20% of front and back of cigarette packs:

Smoking reduces life expectancy
Smoking is the major cause of lung cancer
Smoking is a major cause of heart disease
Smoking during pregnancy can harm the baby

1/90 54% increase in federal taxes on cigarettes over 1/89 (plus additional provincial taxes)

1/90 Additional 4 unattributed health warnings (8 rotating messages):

Smoking is addictive¹
Sidestream smoke can harm non-smokers
Smoking causes lung disease
Smoking causes strokes;

must cover at least 25% of front (in English) and back (in French) of cigarette packs; must be in black and white print; must be at top vs. bottom of package; pack must contain an insert to elaborate on the

¹ This is a "world first." The tobacco industry has successfully defeated all attempts to print this warning on packages in every country where it has been sought, other than in Canada.

warnings, and this insert must hinder the removal of the cigarettes by the consumer; the "toxic contents" of tobacco smoke must be listed on the side of the pack; tar and nicotine data listed on the packs must use the ISO method² ; CO content must be listed on the side of the pack; fine-cut products for roll-your-own cigarettes must list tar, nicotine, and CO values, even though there is no standard method for determination [All of the above is to be phased in beginning 1/91 with full implementation by 6/91]

7/90 Smoking banned on Canadian airline flights of less than 6-hour duration [originally part of the Non-smokers' Rights Act]

11/90 Cigarettes destined for sale in Ontario must have yellow band on packs stating "Ontario"; all cigarettes made for export must have message on pack, "Only for sale outside Canada"

1/91 Additional value-added tax of 7%

Industry Response

Reactions to the legislation in Canada have been varied. As noted above, there is some hope for the industry in the reported feeling that Canadians are beginning to object to so many infringements. But although the following "reactions" have been documented in the trade press, it does not appear that the tobacco industry has waged an aggressive or innovative war against the growing anti-tobacco sentiment.

Lawsuits

Imperial Tobacco and RJR-Macdonald have filed a joint suit in the Superior Court in Quebec against the Tobacco Products Control Act

² The ISO method requires smoking to a shorter butt length, thereby providing greater numbers for tar and nicotine.

Imperial Tobacco and Rothmans-Benson & Hedges have filed a joint **suit in the Superior Court in Quebec** against the Tobacco Products Control Act

Rothmans-Benson & Hedges has filed a **suit in the Federal Court in Toronto** against the Tobacco Products Control Act

Canadian tobacco farmers have filed a **suit against the federal government** for excessive federal and provincial cigarette taxes

Public Relations

Multi-million dollar campaigns portrayed the tobacco companies as **defenders of the freedom of speech**, even if tobacco products ads were to be directed at children under thirteen ("Children under 13 today, so why not 14, 15, or 16 tomorrow?")

Examples of the **"failed" advertising bans in the Scandinavian countries** were touted³

Small shopkeepers were enlisted to write **protests to members of Parliament**; the letters, "some with deliberate typographical errors to create an aura of authenticity," were prepared by the industry for the shopkeepers⁴

A **press event** in Toronto, sponsored by Rothmans and including "recruits" from the arts community, denounced the Tobacco Products Control Act as "potentially dangerous because, **by ending the promotion of tobacco products, it would starve culture and sports**"⁵

³ The Canadian Cancer Society reacted to this tactic of the industry by bringing the chairman of the Norwegian Council on Smoking and Health to Ottawa, where he produced evidence that the ban had worked.

⁴ A full-page advertisement in the press divulged this tactic to the public, further discrediting the tobacco industry and preventing their use of approximately an additional 800,000 names on their mailing lists.

⁵ However, the anti-tobacco forces gathered four times as many artists to speak against tobacco sponsorship.

Corporate Reorganization

Imperial Tobacco and RJR-Macdonald have **incorporated new companies** under their most popular brand names so that they can continue sponsorships (e.g., duMaurier Ltd.); Rothmans-Benson & Hedges did not have to take this step, for obvious reasons

Rothmans-Benson & Hedges has **closed a manufacturing plant** in Mount Royal, outside of Montreal

Patrick J. Fennell, CEO/president of Rothmans-Benson & Hedges, has publicly stated that **inevitably the 3 manufacturers will become 2**; in 3-5 years Rothmans will **begin to diversify**

All three manufacturers are considering **increasing their sales staff** to promote brands "personally" under the advertising ban

Promotions

Manufacturers began offering discounts to consumers in response to the excessive taxes, and this **retail price discounting** is on the increase⁶

Manufacturers are considering **more brightly-designed, eye-catching packaging** to off-set the 25% required warnings

RJR-Macdonald changed the packaging of its Vantage brand to **match the U.S. packaging**, since 65% of all magazines read in Canada are from the U.S. and they hope to piggyback on U.S. advertising⁷

Imperial Tobacco and Rothmans-Benson & Hedges have decided **not to erect any new billboards**, because of the health-warning requirements;

⁶ Rothmans-Benson & Hedges is being sued over this, since rebates are illegal under the Tobacco Products Control Act. RBH maintains that discounts are not rebates.

⁷ Canadian smokers are considered the most brand-loyal of any in the world. There seems to be some, but little serious, concern about Canadians switching to U.S. brands because of products advertised in Canadian-read foreign magazines.

although RJR-Macdonald said that it would continue to advertise on billboards, it has not erected any new ones either

Introductions

The only new product we can identify is Superroll 200 Number 7 Supercut, a fine-cut roll-your-own product introduced by Rothmans-Benson & Hedges 11/89^{*}

Fallout

Rather than reveal **additives** in its cigarettes, **RJR-Macdonald stopped using them**; **Philip Morris stopped shipments** of its cigarettes into Canada

Manufacturers **withheld remittance to the government of increased sales taxes** of 0.50/package in 4/89 until the federal budget was passed in 12/89, allowing the manufacturers to enjoy the interest on almost \$630 million

Manufacturers expect that the cost of changing their packaging so frequently to comply with the required warnings will prompt them to **eliminate small or marginal brands** from their product lines

Smuggling has become a booming business, both inter-country and inter-provincial; the resident Indians have also discovered a source of income with **black-market tobacco products**, since they are allowed to purchase without paying the excessive taxes

The **duty-free shops** have become a goldmine for Canadian cigarette manufacturers on both sides of the Canadian/U.S. border; **exports are up**

^{*} We cannot verify this through J. E. Wickham, since he no longer follows the Canadian market.

The anti-tobacco coalition is now trying to push through legislation requiring **all cigarettes to have generic packaging**; they also are trying to place a **ban on all chewing tobacco**

Decreased sales (down 6.66% in 1989 over 1988) are being attributed by the industry to increased taxes rather than to "changes in the incidence of smoking":

| <u>1989</u> | <u>1988</u> |
|-----------------------|-----------------------|
| 160 brands/extensions | 169 brands/extensions |
| 4900 mfg employees | 5041 mfg employees |

Scandinavian Countries

Of related interest is the effect of the ban on tobacco advertising in Norway, Finland, Denmark, and Sweden. Sweden is a snuff (snus) market; Denmark is a cigar/cigarillo market; Norway is a fine-cut market; Finland is a cigarette market. The tobacco industry in Canada has pointed to these studies to show that advertising bans are not effective. As stated above, the Nonsmokers' Rights Association and Canadian Cancer Society arranged for the health minister from Norway to appear before Parliament to refute these industry claims.

Finland

A ban on the advertisement of tobacco products, along with far-reaching smoking restrictions, was instituted in **1973**. The tobacco products market is **growing**.

Norway

A ban on the advertisement of tobacco products was instituted in **1975**. The market for tobacco products is considered **steady**, with a rise in cigarette demand off-setting a decline in smoking tobacco demand.

2026230539

Denmark

There is very little anti-tobacco legislation in Denmark, with the exception of advertising directed at youth. However, the country has been experiencing a **steady decline** in the consumption of tobacco products.

Sweden

Restrictions on smoking have been in place since 1971, and an advertising ban is presently planned. With the exception of the fine-cut products, the tobacco market in general has shown a **steady decline**.

Analysts explain the situation in the Scandinavian countries by out-of-sight/out-of-mind, i.e., "the ban on advertising has made the 'enemy' invisible." There are no longer discussions and debates about the effects of tobacco consumption in the press or on the radio or television, with the bans in effect in Finland and Norway for so very many years. And the consumers therefore follow their own minds. However, the theory that advertising does not affect tobacco consumption is not widely held outside the industry, and anti-tobacco factions still point to the decline of consumption in Canada as a direct result of the advertising ban and other restrictions rather than the severe increases in taxation.

cc: Central File



2026230540

Lightweight cigarette
sparks controversy
in Canada

Imperial Tobacco's lightweight, experimental cigarette is drawing heavy opposition from the Canadian Cancer Society.

Tobacco in each cigarette is injected with air, making it weigh much less than standard cigarettes. Canada taxes tobacco based on weight. Thus, the air-injected cigarettes are less expensive. The price difference can be substantial. In the province of New Brunswick, a carton of standard cigarettes costs about c\$35. A comparable amount of the new product costs less than c\$18.

2026230542

APPENDIX L

EHS Five-Year Environmental Plan

Draft

2026230543

Environmental, Health & Safety

Five Year Plan

1991 - 1995

2026230544

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PHILIP MORRIS USA
E,H&S PLAN : 1991-1995

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OVERVIEW

To be completed

2026230547

PHILIP MORRIS USA
E,H&S PLAN : 1991-1995

EXPLANATION OF RESPONSIBILITY

| Abbreviation: | Department: |
|---------------|---------------------------------------|
| • EEP | Employee & Environmental Protection |
| • ENG | Engineering |
| • FAC | Facility |
| • FIN | Finance |
| • IS | Information Services |
| • LEGAL | Legal (NY Legal or Hunton & Williams) |
| • MED | Medical |
| • PA | Pesticide Administrator (QA) |
| • PUR | Purchasing |
| • QA | Quality Assurance |
| • R&D | Research & Development |
| • RSC | Radiation Safety Committee |
| • RSO | Radiation Safety Officer (QA) |
| • SEC | Security |
| • TRANS | Transportation |

For each **Action Plan** listed, primary responsibility is assigned by department(s) or in special cases by title. It is recognized that for many **Action Plans** several departments may require involvement; however, only those groups with responsibility for coordination are included. If more than one department is listed, the first department has overall coordinating responsibility.

Action Plans assigned to FAC (facility) apply to specific facilities, if applicable, and should be included in the facility's Five Year Plan.

2026230548

AIR ISSUES

2026230549

AIR - COMBUSTION SOURCES & SO₂/NO_x

Issues:

- EPA has promulgated regulations to restrict the amount of sulfur dioxide (SO₂) and nitrogen oxides (NO_x) that can be emitted from new boilers. Fuels with lower sulfur content are being required to meet emission limits.
 - NO_x contributes to the formation of lower level ozone (smog) in urban areas. SO₂ contributes to the formation of *Acid Rain*.
-

Strategy:

- Secure cleaner fuel sources at reasonable cost: Bring natural gas to boilers; negotiate for low sulfur oil.
 - Be prepared to institute SO₂ controls: Construct and operate SO₂ scrubbers; install flue gas desulfurization.
 - Be prepared to institute NO_x controls: Install low NO_x burners; install ammonia injection into flue gas.
 - Ensure compliance with air permits for proper sulfur content of fuels.
-

Action Plans:

Responsibility:

1. Investigate the availability (short and long term) of an uninterruptible supply of natural gas.
2. Prepare preliminary design and cost data on equipping boilers for natural gas operation if availability is confirmed.
3. Investigate the feasibility of purchasing steam from a cogeneration facility to reduce environmental liabilities of boiler operations.
4. Prepare preliminary designs and costs on equipping boilers with low NO_x burners and ammonia injection into flue gases.
5. Audit purchase of fuels to ensure proper sulfur content per air permits.

PUR

ENG

ENG

ENG

EEP

2026230550

AIR - PM-10 PARTICULATES

Issues:

- EPA has changed the definition of Particulate Matter (*PM*) to include smaller particles. This definition, which is referred to as *PM10*, includes particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers.
 - At this time all particulate emissions are assumed to be *PM10* unless testing data demonstrates otherwise.
 - As EPA and the states gain experience in estimating *PM10* emissions, more restrictive controls could be required.
-

Strategy:

- Identify particulate sources and assess particulate size distribution. Use this data to assess the impact on new emission points.
-

Action Plans:

Responsibility:

- | | |
|---|---------|
| 1. Identify all sources of particulate emission. | EEP |
| 2. Measure size and quantity from a representative sampling of systems at each location to determine potential impact. | EEP |
| 3. Evaluate dust collection technology for efficiency in the capture of particulates. Prepare preliminary design and cost estimates to upgrade control equipment to meet new regulations. | ENG/EEP |

2026230551

AIR - POLLUTANTS AND THE UPPER ATMOSPHERE

Issues:

- Scientists believe that depletion of the upper ozone layer will cause increased health risks.
 - Chlorofluorocarbons (CFC's) emitted from manufacturing processes are targeted for reductions in order to protect the upper ozone layer (*Montreal Protocol*).
 - Carbon dioxide (CO₂) emissions are believed to be contributing to the *Greenhouse Effect* (e.g., a gradual global warming). EPA is looking at CO₂ emissions and assessing the need for control.
 - PM USA directly emits large amounts of carbon dioxide to the atmosphere from manufacturing and fuel burning processes, and indirectly emits CFC's from air handling equipment and fire suppression systems.
-

Strategy:

- Minimize carbon dioxide and CFC emissions (e.g., reclaim, reuse, reduce or modify processes).
 - Plan for the eventual elimination of CFC's based on vendor substitution.
-

Action Plans:

1. Identify and quantify emissions.
2. Monitor the availability of current CFC's and substitutes as well as pricing trends for each.
3. Determine the impact of refrigeration capacity if refrigerants with lower performance ratings will be required.
4. Evaluate operating, maintenance and cost impacts of changes in refrigeration technologies.
5. Identify potential CFC recycling vendors.
Approve vendors and methods of recycling.
6. Evaluate methods for CO₂ control or recovery from process discharges, and impact on operation, maintenance and cost. Determine cost per pound and % of recovery.

Responsibility:

EEP
ENG
ENG/FAC
ENG
EEP/ENG
ENG

2026230552

AIR - TOXIC AIR EMISSIONS

Issues:

- Congress will require the control of toxic air emissions through amendments to the Clean Air Act. Kentucky, Virginia and North Carolina already have toxic emission regulations.
 - Public awareness to air toxic emissions is increasing due to Community Right-To-Know reporting and media disclosure.
 - Emissions that may require further control include: phosphine (warehouse fumigation), nicotine, and ammonia.
-

Strategy:

- Assess compliance with state standards through scientific analysis of emissions and act upon this assessment.
 - Reduce and gradually eliminate phosphine emissions from warehouse fumigations.
-

Action Plans:

Responsibility:

- | | |
|--|---------|
| 1. Identify and quantify emissions, to include computer modeling. | EEP/FAC |
| 2. Investigate and estimate the cost to reduce emissions based on regulations and modeling. | ENG/EEP |
| 3. Research the degradation of identified emissions to better define levels at the fence line. | R&D |
| 4. Evaluate the use of activated charcoal adsorption systems to clear fumigated warehouses. | ENG |
| 5. Work with Tobacco Stabilization Corp. for the technical review of emissions computer modeling during fumigation aeration. | R&D |
| 6. Reduce the amount of phosphine used to fumigate warehouses based on historical data. | QA/R&D |
| 7. Install systems to treat tobacco with Kabat, thereby reducing fumigation of tobacco warehouses. | ENG |
| 8. Implement further tobacco treatment with Kabat. | QA/R&D |

2026230553

AIR - VOC EMISSIONS

Issues:

- Volatile Organic Compound (VOC) emissions contribute to the formation of lower level ozone (smog).
 - EPA is exerting greater pressure on the states to develop control strategies to reduce VOC emissions, especially in major urban areas (e.g., Richmond, Charlotte and Louisville).
 - States have no choice but to control existing emitters of VOC's and to restrict any new emission sources.
 - New emissions of VOC's will not be allowed in urban areas, unless there is a 120% reduction of emissions somewhere in the area to offset any new emissions.
 - VOC offsets and reductions could affect manufacturing flexibility and the introduction of new products or processes.
 - The definition of VOC is being expanded by EPA to regulate a broad range of substances. Ethanol, propylene glycol and glycerin are considered VOC's.
 - PM USA has entered into consent agreements with the Virginia Air Board to control VOC (ethanol) emissions from Richmond factories and Colonial Heights Packaging.
-

Strategy:

- Reduce VOC emissions through control technologies and process changes.
 - Develop plans to reduce or control VOC emissions beyond what is currently required by the states.
 - Comply with consent agreements.
-

Action Plans:

Responsibility:

- | | |
|---|---------|
| 1. Identify and quantify emissions. | EEP/FAC |
| 2. Research the best technologies for VOC control. Install appropriate controls for VOC emission reductions at Richmond facilities. | ENG/FAC |
| 3. Upgrade exhaust and incineration systems at Colonial Heights Packaging to reduce emissions. | ENG/FAC |
| 4. Continue research on processes which will allow reduction in current VOC use. | R&D |
| 5. Develop mechanism to coordinate research activities with other functions to discuss process or raw material changes to reduce VOC emissions. | R&D |

2026230554

WATER ISSUES

2026230555

WATER - PHOSPHORUS & NITROGEN REDUCTIONS

Issues:

- EPA has given the states broad powers to control the discharge of nutrients like phosphorus and nitrogen.
 - In 1988, Virginia banned the sale and use of phosphate detergents.
 - In 1989, Virginia passed a phosphorus reduction regulation requiring all discharges over 1 million gallons per day to reduce phosphorus to 2 parts per million. Park 500 is covered by this regulation.
 - Virginia is also seriously considering regulating the discharge of nitrogen compounds. Ammonia, which contains nitrogen, is already regulated as a toxic pollutant.
 - Both Park 500 and the Blended Leaf Plant discharge significant quantities of phosphorus and nitrogen.
-

Strategy:

- Reduce the phosphorus discharges at Park 500 to meet state standards.
 - Study BL Plant and Park 500 process discharges, review available treatment methods and report on the feasibility and economies of further reducing phosphorus and nitrogen discharges.
-

Action Plans:

1. Upgrade the Park 500 wastewater treatment plant to remove phosphorus.
2. Install a biological nitrogen removal *pilot plant* at Park 500.
3. Evaluate pre-treatment systems for BL Plant.

Responsibility:

FAC/ENG

FAC/ENG

FAC/ENG

2026230556

WATER - STORM WATER DISCHARGE PERMITS

Issues:

- The Clean Water Act requires the EPA to issue permits for all discharges of pollutants; however, the EPA opted not to include storm water discharges in the permitting process.
 - Environmental groups successfully sued the EPA to require permits for storm water run off from industries and municipalities.
 - The deadline for applying for storm water permits has passed but EPA has not yet published regulations or application forms for these new permits.
-

Strategy:

- Comply with regulations when they are promulgated.
-

Action Plans:

1. Identify all storm water discharge points that will require a permit.
2. Develop specific plan when final EPA rule is issued.

Responsibility:

EEP/FAC

EEP

2026230557

WATER - UNDERGROUND STORAGE TANKS

Issues:

- EPA and the states have issued new underground storage tank (UST) regulations requiring corrosion protection, spill and overflow prevention, and leak detection for all UST's.
 - Prior to implementation of the new regulation 15 tanks were removed and replaced; however, there are still 7 old UST's remaining.
 - Leaking tanks must be prevented—clean up of an UST spill is very expensive.
-

Strategy:

- Continue to upgrade or replace UST's at all locations.
 - Replace UST's with aboveground tanks where feasible.
 - Ensure that procedures for operation, maintenance, leak monitoring and spill prevention of new and existing UST's are maintained.
-

Action Plans:

Responsibility:

- | | |
|---|---------|
| 1. Develop a PM USA Tank Management Plan. | EEP |
| 2. Remove and/or replace old UST's with above ground tanks or UST's that meet new standard. | FAC |
| 3. Implement leak detection and UST maintenance program for all underground tanks. | FAC |
| 4. Develop Spill Prevention Plans (SPCC) for all new above ground tanks. | EEP/FAC |

2026230558

WASTE ISSUES

2026230559

WASTE - BURNING USED OIL

Issues:

- PM USA pays waste oil recyclers to dispose of waste oil. In addition to the cost, there is potential liability if the vendor mixes our waste oil with other wastes that might contain hazardous materials.
-

Strategy:

- As allowed and permitted under state air pollution regulations, burn used oil.
-

Action Plans:

Responsibility:

- | | |
|---|---------|
| 1. Identify sources and quantities of waste oil. | FAC/EEP |
| 2. Determine most viable location(s) for burning oil. | FAC/EEP |
| 3. Construct waste oil storage facilities. | FAC |
| 4. Establish procedures for routine testing, collection, transport and audit. | EEP |

2026230560

WASTE - HAZARDOUS WASTE MANAGEMENT

Issues:

- Hazardous materials, as defined by the EPA, are banned from all *municipal* landfills. These materials can be disposed of in *hazardous waste* landfills if they meet new treatment standards. However, industry is faced with the following:
 - Some treatment standards are too restrictive and unattainable.
 - Hazardous waste landfills are scarce and filling to capacity.
 - Most, if not all, of these landfills have contamination problems.
 - The few states with hazardous waste landfills are trying to restrict wastes from other states.
 - The only viable option for disposal of some types of hazardous waste is incineration at permitted hazardous waste facilities; however, the ash resulting from incineration is also a concern if it contains certain toxic materials. Landfilling the ash may become more restrictive. Disposal costs are steadily increasing and reputable disposal facilities are becoming scarce.
 - Most of our hazardous waste is generated in laboratories.
 - Some wastes, such as tobacco dust mixed with sand or dirt, may at a later date be classified as hazardous.
 - Waste generated by contractors performing PM USA work pose potential liabilities.
-

Strategy:

- Reduce the quantity of hazardous wastes.
 - Increase disposal flexibility while reducing potential liability for illegal or improper disposal.
 - Control contractor generated hazardous waste.
-

Action Plans:

Responsibility:

- | | |
|--|--------|
| 1. Develop and maintain a tracking system and database of hazardous waste generated and disposal sites. | EEP/IS |
| 2. Expand the list of approved hazardous waste disposal facilities to be able to get competitive pricing. | EEP |
| 3. Continue to audit all disposal facilities for compliance. | EEP |
| 4. Evaluate laboratory testing procedures to find ways to substitute hazardous with non-hazardous materials, and thus minimizing hazardous waste generation. | R&D |

2026230561

WASTE - HAZARDOUS WASTE MANAGEMENT *(continued)*

Action Plans:

Responsibility:

5. Implement the R&D waste control program in the QA laboratories.
6. Evaluate methods to remove sand from tobacco prior to processing.
7. Develop and implement a pre-treatment system to dispose of process waste at Bermuda Hundred.
8. Establish procedures to properly manage and dispose of contractor-generated hazardous waste.

R&D/QA

R&D

ENG/R&D

EEP/PUR

2026230562

WASTE - SOLID WASTE MINIMIZATION

Issues:

- Federal, state and local laws and regulations are mandating solid waste minimization and recycling as existing landfills are rapidly filling to capacity and new landfills are costly to develop and operate.
 - EPA has set a national goal to reduce the nation's municipal wastes 25% by 1992.
 - States are beginning to legislate landfill reductions for local governments. Virginia and North Carolina are legislating increases in *recycling* (Virginia—25% by 1995, North Carolina—25% by 1993, Kentucky—no activity at this time.) In Virginia, cities and counties must submit comprehensive waste minimization plans by July 1991.
 - PM USA generates approximately 59,100 tons of solid waste annually: 69% is mixed waste and 31% is process waste.
 - Currently, 16% of mixed waste is recycled, with a total recycle potential of 65%. 3% of the process waste is recycled, with a total recycle potential of 50%.
 - Some wastes may be considered proprietary materials thus requiring special handling or exclusion from recycling and other minimization efforts.
-

Strategy:

- Develop a coordinated solid waste minimization program with emphasis on *recycling* and *source reduction*.
 - By 1992, recycle 65% of the mixed waste with an emphasis on paper waste.
 - By 1992, recycle 50% of the process waste with an emphasis on waste sludge.
 - Increase the use of recycled materials in all appropriate areas of the business (e.g., office/administrative areas).
-

Action Plans:

Responsibility:

1. Prepare a written, integrated PM USA Solid Waste Management Plan. Assign overall coordination to EEP.
2. Develop and maintain a tracking system and database for all solid waste streams.
3. Identify individual(s) within each facility as focal points for communication, reporting and results.
4. Identify sensitive components for exclusion from this activity, or for special handling [e.g., proprietary materials].

EEP

EEP/IS

EEP

R&D

2026230563

WASTE - SOLID WASTE MINIMIZATION *(continued)*

Actions Plans:

Responsibility:

- | | |
|---|---------|
| 5. Negotiate a contract to implement a material recycling facility, for recycling approximately 65% of mixed solid waste. | EEP/PUR |
| 6. Develop appropriate employee awareness programs to support the material recycling concept. | EEP |
| 7. Establish criteria to purchase recycled materials. Identify applications for recyclables and test them. | PUR/EEP |
| 8. Develop methods for disposal of Park 500 sludge. | ENG |
| 9. Study methods to reuse or minimize generation of sand from stemming. | EEP/ENG |
| 10. Study uses for flyash. | ENG |
| 11. Review processes to identify potential source reductions. | FAC/ENG |

2026230564

WASTE - SUPERFUND SITES

Issues:

- The Superfund law (CERCLA) allows the EPA to collect the entire cost of cleaning up a toxic dump site from anyone who contributed to the site.
 - Many old, legally permitted disposal sites are becoming Superfund sites as the EPA identifies problems at them.
 - In the last year, PM USA has been notified of two Superfund sites which may contain PM materials.
 - Other PM companies are also involved in Superfund sites (estimated at 50).
-

Strategy:

- Ensure today's disposal sites do not become tomorrow's Superfund sites.
 - Monitor status of disposal sites currently being used to assess any changes in their regulatory status.
-

Action Plans:

1. Annually review each disposal site used and assess regulatory status. If a site closes, evaluate potential impact on company.
2. Continue auditing and approving all disposal sites prior to using them.
3. Work with other operating companies to coordinate sites where more than one operating company is involved.

Responsibility:

EEP/LEGAL

EEP

EEP/LEGAL

2026230565

HAZARDOUS MATERIALS ISSUES

2026230566

HAZARDOUS MATERIALS - ASBESTOS

Issues:

- OSHA standards regulating asbestos exposures were recently reduced from 2.0 fibers per cubic centimeter (f/cc) of air to 0.2 f/cc. There is a new proposal to lower the limits even further.
 - Asbestos is also regulated by the EPA and several state agencies. This creates difficulties for compliance efforts since industry must deal with several agencies which have different, and at times conflicting, agendas.
 - Since 1981, PM USA has managed asbestos and removed it as needed through the use of contractors. No comprehensive plan budgeting for all removal has been implemented.
 - Asbestos is encapsulated throughout all facilities; however, inadvertent release and potential product contamination is a possibility.
-

Strategy:

- Remove the remaining asbestos from all facilities.
 - Ensure that all asbestos sites are identified and clearly marked until removal is complete.
-

Action Plans:

1. Develop plant specific plans to identify and mark the remaining asbestos, determine the cost of removal, and establish a schedule for removal.
2. Establish a special expense account to track and budget for removal costs.
3. Monitor and document removal projects.

Responsibility:

FAC

FIN

EEP

2026230567

HAZARDOUS MATERIALS - CHEMICAL HYGIENE PLAN (LABORATORIES)

Issues:

- OSHA has promulgated a new standard entitled *Occupational Exposures to Hazardous Chemicals in Laboratories*.
 - The standard requires that a written Chemical Hygiene Plan be prepared and implemented for all laboratories by January 31, 1991.
 - R&D and QA labs are affected by this standard.
 - PM USA laboratories currently maintain programs that are considered part of this compliance requirement.
-

Strategy:

- Comply with the standard by developing a Chemical Hygiene Plan, incorporating existing programs.
-

Action Plans:

Responsibility:

- | | |
|---|------------|
| 1. Identify all laboratories that are affected. | EEP |
| 2. Write PM USA Chemical Hygiene Plan. | EEP/R&D/QA |
| 3. Update lab designs and equipment to meet requirements, if required. | FAC |
| 4. Review laboratory job procedures for completeness and protective equipment. Update or develop as required. | FAC |
| 5. Develop training program for current employees, as well as for new or transferred employees. | EEP |
| 6. Establish mechanism for identifying new or transferred employees. | EEP/IS |
| 7. Conduct training company-wide. | EEP/FAC |
| 8. Audit compliance. | EEP |

2026230568

HAZARDOUS MATERIALS - CHEMICAL INVENTORY MANAGEMENT (*RIGHT-TO-KNOW*)

Issues:

- Regulations require that inventories be maintained of chemicals used throughout all facilities:
 - OSHA requires that a current inventory of all hazardous chemicals known to be present in each facility must be compiled, maintained and made available to employees.
 - EPA requires that a current hazardous chemical inventory be prepared for emergency planning and community right-to-know, and that certain materials be reported to various state and local officials, as well as the EPA.
 - Virginia Health Department requires annual chemical inventory reporting of substances used as raw materials, catalysts, final products or process solvents.
 - Maintaining inventories is labor intensive and is often out-of-date as soon as it is completed. It is estimated that 3,000 distinct chemicals in over 6,000 container types and storage locations must be tracked. The labor to maintain this effort is estimated to cost about \$360,000 per year.
 - Different chemicals are often purchased for the same type of job, thus increasing the inventory of distinct chemicals which must be tracked and reported.
 - Accuracy of these inventories is extremely important to ensure that materials are not under or over reported. Unfortunately, the current method is inaccurate and labor intensive, thus maintaining compliance is quite difficult. Over the last 16 months there has been 5 instances where information was needed but could not be immediately located.
 - A mainframe computer program (*Chemical Inventory Subsystem—CISS*) is maintained to manage all the reporting requirements—this program works. The primary issue is obtaining the information which goes into the system.
 - Contractors are required to notify PM USA of materials brought onto PM property; however, this is often not done.
-

Strategy:

- Computerize the process of tracking, linking it to the *CISS*.
 - Minimize the purchase of different chemicals for the same job.
 - Control the use of chemicals by contractors working on PM property.
-

Action Plans:

1. Define specific requirements to automate a tracking system.

Responsibility:

EEP

2026230569

HAZARDOUS MATERIALS - CHEMICAL INVENTORY MANAGEMENT (*RIGHT-TO-KNOW*) (*continued*)

Action Plans:

Responsibility:

2. Define current computerized company systems,
assess linkage and conduct feasibility study based on
system requirements.
3. Develop a tracking system based on the
feasibility study.
4. Review the purchase of chemicals and set a
company policy to control redundancy and duplication.
5. Develop better controls for contractors to
ensure review of their materials.

IS

IS

PUR

PUR/EEP

2026230570

HAZARDOUS MATERIALS - HVAC/BOILER SYSTEM WATER TREATMENT

Issues:

- Hazardous materials must be used to maintain and operate HVAC systems.
 - Microbial activity in HVAC systems must be controlled to prevent the onset of illnesses.
-

Strategy:

- Operate and maintain HVAC systems to minimize employee exposure to water treatment chemicals and microbial activity.
-

Action Plans:

Responsibility:

- | | |
|---|---------|
| 1. Investigate different methods of filtration of washer air streams that would reduce biocide requirements. | ENG |
| 2. Identify systems where water volume reductions may be made without interfering with equipment performance. | ENG/FAC |
| 3. Identify systems where bulk or mini-bulk systems may be used to reduce the number of pumping stations. | ENG/FAC |
| 4. Evaluate new biocides, polymers and bio-rational techniques which may be substituted for current biocides. | QA |
| 5. Evaluate water side filtration for dust and microbial removal. | ENG |
| 6. Develop products and techniques to remove microbial masses from HVAC systems during manual cleaning. | ENG |
| 7. Restrict the use of compressed air in clean-up of tobacco dust or turn off washer air intakes during cleaning. | FAC |

2026230571

HAZARDOUS MATERIALS - INDOOR AIR QUALITY

Issues:

- Exposure to chemicals in the workplace continues to be a major priority of OSHA.
 - Some materials are not regulated, yet they can cause irritation in some individuals. Although these materials are not specifically regulated, OSHA can enforce compliance through the *General Duty Clause*. Menthol falls within this group.
 - Extensive monitoring has taken place throughout PM facilities (approximately 4200 sample results to date); however, most of this monitoring has not been based on a planned schedule, but rather on an as needed basis.
-

Strategy:

- Monitor indoor air quality on a planned basis to ensure on-going OSHA compliance.
 - Develop internal PM standards for materials that are not specifically regulated and which may cause irritation.
-

Action Plans:

Responsibility:

- | | |
|---|-------------|
| 1. Identify materials that should be monitored on a planned basis, and establish a schedule. | EEP |
| 2. Develop a mainframe based system for scheduling and tracking monitoring which interfaces with the current industrial hygiene data management system. | IS/EEP |
| 3. Identify unregulated materials for which internal standards should be developed. Develop standards and include in plan. | EEP/R&D |
| 4. Develop and implement exposure reduction plans based on environmental monitoring. | FAC/ENG/EEP |
| 5. Investigate and mitigate any incident of sick building syndrome or employee illness. | EEP/ENG/FAC |

2026230572

HAZARDOUS MATERIALS - PESTICIDE MANAGEMENT

Issues:

- There is a growing public concern about the practices of the pest control industry overall.
 - The company must ensure that the use of pesticides does not draw unnecessary attention to the tobacco industry.
-

Strategy:

- Minimize the use of pesticides through improved sanitation practices, performing pesticide applications only when there is a documented need.
 - Maintain a standardized and consistent approach to pesticide management to ensure employee and public safety.
 - Investigate chemical pesticide alternatives.
-

Action Plans:

Responsibility:

- | | |
|--|--------|
| 1. Implement written, verifiable sanitation programs based on the PM USA <i>Infestation Control Manual</i> . | PA/R&D |
| 2. Prepare and implement job procedures. | PA |
| 3. Update annually the "acceptable pesticides" list. | R&D |
| 4. Upgrade all pesticide storage facilities to include neutralization capabilities for containers and unused mixtures. | FAC |
| 5. Apply pesticides according to a documented need and label restrictions; when sanitation efforts have failed or in areas inaccessible to cleaning. | QA |
| 6. Develop a central tracking system for all pesticide purchases and usage. | PA/IS |
| 7. Establish in-house training programs for all pesticide applicators and their supervision including state re-certification. | PA/EEP |
| 8. Establish conditioning cycles for obtaining Phyto certificates and eliminate methyl bromide fumigations. | R&D |

2026230573

HAZARDOUS MATERIALS - RADIATION

Issues:

- PM uses radioactive sources, both licensed and non-licensed, as well as radiation producing equipment, such as x-rays. There continues to be a negative perception in the general public regarding the use and affects of radiation. Consumer products companies face the potential risk of negative publicity in the event of an incident involving a radioactive source or radiation generating device.
 - As licensed materials, nuclear radiation sources, as found in nuclear gauges, are heavily regulated and require extensive recordkeeping to ensure compliance.
 - Although nuclear gauges, using sealed radioactive sources, are reliable, safe and an accepted method for measurement, an incident involving these devices, even in a peripheral way, could cause negative publicity.
 - Several radioactive devices containing Americium, such as smoke detectors or static eliminators, are distributed to consumers without a license. Because they are not controlled by strict licensing requirements at the user level, these devices are very easily discarded improperly in municipal landfills.
-

Strategy:

- Minimize the use of radioactive sources and devices wherever possible. Investigate alternatives.
 - Strictly control the use and disposal of all radioactive sources, both licensed and non-licensed.
 - Ensure that all employees are adequately trained in the proper use and control of radioactive sources and radiation producing devices.
-

Action Plans:

1. Evaluate alternatives to all forms of radiation.
2. Determine if present source strength could be decreased (newer technology).
3. Continue to audit user group compliance to the present Radiation Safety Program.
4. Examine methods to improve the Radiation Safety Program to further minimize the potential liabilities.
5. Continue to require that all PM employees working with either nuclear devices or x-ray equipment receive *documented* training and certification for performing their assigned jobs.

Responsibility:

ENG/RSO

ENG/RSO

RSO/QA

RSO/QA

RSC

2026230574

HAZARDOUS MATERIALS - RADIATION *(continued)*

Action Plans:

Responsibility:

6. Establish formal procedures to ensure that non-licensed devices are disposed of through vendors. Audit compliance, internally and vendor.
7. Upgrade present system for mailroom security to minimize employee exposure.

RSO

SEC

2026230575

HAZARDOUS MATERIALS - TRANSPORTATION OF HAZARDOUS MATERIALS (DOT)

Issues:

- PM USA ships, both domestically and internationally, materials that are regulated as *hazardous*.
 - Major changes to the US Department of Transportation (DOT) regulations have been proposed which will change the shipping nomenclature to international standards.
 - Effective January 1, 1991, all international shipments must be packaged in containers meeting international performance standards.
 - New DOT regulations require 24 hour emergency telephone numbers and spill response information with every shipment of hazardous materials.
 - Because every facility ships hazardous materials, coordination or control of these activities is essential.
 - There has been confusion as to the responsibilities of PM USA and PM International regarding international shipments of flavors originating in Richmond.
-

Strategy:

- Comply with all domestic and international shipping regulations. Ensure the safety of employees, carriers and the public.
 - Ensure that PM USA has advanced warning of proposed changes to transportation regulations, and appropriately plans for their implementation.
 - Improve communications, training and coordination for personnel involved in shipping hazardous materials, including PM International. Ensure coordination through EEP.
-

Action Plans:

Responsibility:

- | | |
|--|-----------|
| 1. Prepare a PM USA transportation policy and procedure. Establish overall coordination and responsibility. | EEP/LEGAL |
| 2. Establish PM standardized shipping papers for all transportation of hazardous materials. | EEP |
| 3. Identify functional groups or individuals with transportation responsibilities, and provide on-going DOT training, to include new employee courses, on the job training using job procedures, and advanced or specialized seminars. | EEP |
| 4. Establish a task group to review and plan for performance packaging standards. | EEP/TRANS |

2026230576

EMPLOYEE SAFETY & HEALTH ISSUES

2026230577

EMPLOYEE SAFETY & HEALTH - ERGONOMICS

Issues:

- OSHA is seriously assessing workplace injuries and illnesses resulting from cumulative trauma and repetitive motion. Labor unions are also pushing for action in this area. The result: ergonomic regulations will be promulgated.
 - With the rapid growth in the use of personal computers, many workstations are improperly designed. Video display terminals (VDT) and keyboards are placed on existing equipment designed for typewriters, but not for computers.
 - With technological advancements in manufacturing, equipment, buttons, switches and gauges are being replaced by visual displays, touch screen communications and software controls. These innovations are only as reliable as the employee's ability to rapidly recognize and properly respond to control the desired parameters. New job functions can create new physical stresses.
 - Material handling related injuries continue to be a major category of injuries.
-

Strategy:

- Resolve the question: To what extent are PM USA employees experiencing ergonomically-related injuries or illnesses?
 - Prevent ergonomic injuries or illnesses through workplace and equipment design.
-

Action Plans:

1. Review injury and illness record to define ergonomic related cases.
2. Based on the review develop an overall ergonomic plan to focus resources on potential problems areas.
3. Develop specific criteria for workplace and equipment ergonomic design.
4. Establish vendor specifications and implement with vendors.

Responsibility:

EEP
EEP
EEP/ENG
EEP/PUR

2026230578

EMPLOYEE SAFETY & HEALTH - WORKERS' COMPENSATION

Issues:

- The cost of medical treatment for injured workers continues to rise.
 - The severity of workplace injuries, as *measured by days away from work*, has been gradually increasing for PM USA, inspite of a downward trend for the frequency of injuries.
 - The increase in severity began with the elimination of on-site company doctors and the reliance on outside physician services. Historically, outside physicians tend to keep workers off the job longer. Utilizing a company physician as liaison with local physicians is an essential element to controlling disability management.
 - Disability management continues to be a priority; however, there is no mechanism in place to track the type of treatment, length of disability and associated cost on a *physician by physician basis*. This information is necessary to ensure quality at a reasonable cost through the selection of physicians who understand the industrial environment and are willing to work with industry.
-

Strategy:

- Reverse the trend—reduce the severity of injuries by tracking physician services and cost, selecting physicians for referral based on PM USA expectations and improve relations with local physicians.
 - Reassess on-site physician coverage. Maintain a physician liaison between the company and local physicians.
-

Action Plans:

Responsibility:

1. Review the existing Claims, Medical and Hartford Insurance computer systems and develop method to track (or extract) appropriate data.
2. Develop criteria for reviewing physician services and rating on quality of service and cost based on type of injury and treatment.
3. Review the Panel of Physicians quarterly in light of the data and adjust accordingly.
4. Maintain a physician liaison.

IS/EEP/MED

MED/EEP

EEP/MED

MED

ENVIRONMENTAL, HEALTH & SAFETY
- GENERAL ISSUES -

2026230580

ENVIRONMENTAL, HEALTH & SAFETY - AUDITS

Issues:

- The stakes are increasing for non-compliance with environmental, and occupational safety and health regulations. EPA and OSHA fines can exceed a million dollars depending on the type of violation. For OSHA violations willful acts can result in *egregious* penalties.
 - Violations can result in civil and criminal action. Virginia OSHA recently developed procedures for notifying the State Attorney General's office of criminal actions.
 - Violations of regulations receive much press coverage.
 - Violations can result in consent agreements which may not be to the benefit of the company.
 - There have been efforts to standardize compliance efforts at all facilities, but there is no mechanism to ensure that all are following the plans or procedures.
-

Strategy:

- Conduct more frequent and cost effective audits.
-

Action Plans:

1. Develop and implement a PM USA Environmental, Health and Safety Audit Plan for all facilities, to be conducted annually. [evaluate the need for outside services based on resources]
2. Develop and maintain a computerized database to track audit results and corrective action. Assess portable data collection terminals linked to PC based system.

Responsibility:

EEP/LEGAL

IS/EEP

2026230581

ENVIRONMENTAL, HEALTH & SAFETY - EMERGENCY MANAGEMENT PLAN

Issues:

- EPA, OSHA and DOT are all placing more emphasis on emergency planning and response, particularly for hazardous material spills and releases.
 - OSHA recently issued a new standard entitled *Hazardous Waste Operators and Emergency Response*, which requires a written plan along with extensive training, both initially and annually, for emergency responders.
 - Community Right-To-Know initiatives by EPA have created a heightened awareness on the part of the public and the media whenever an emergency occurs involving a hazardous material, regardless of the magnitude of the incident.
 - DOT recently enacted regulations requiring emergency hazard information to be available to the shipper for the shipment of all hazardous materials.
 - Local fire departments are requiring more pre-planning on the part of industry located in their area, with special emphasis on hazardous materials.
 - PM USA first prepared a comprehensive written Emergency Management Plan (*EMP*) in 1983. This plan has been modified over the years to meet all the requirements of these regulations; however, the plan has not been fully implemented and maintained at all facilities.
-

Strategy:

- Maintain emergency management plans, providing the resources and training necessary to ensure that all types of emergency situations are handled properly, efficiently and in compliance with all appropriate regulations.
-

Action Plans:

1. Complete and maintain the *EMP* for all facilities, with special emphasis on site specific plans.
2. Conduct initial and annual training.
3. Conduct pre-plans with Fire Departments.

Responsibility:

FAC/EEP

EEP/FAC

FAC/EEP

ENVIRONMENTAL, HEALTH & SAFETY - TRAINING

Issues:

- Training required by OSHA, EPA and DOT regulations continues to increase in number and in complexity. Initial and annual re-training is often required which impacts all levels of personnel. Documentation is essential to prove compliance.
 - To ensure that the appropriate personnel are trained at the proper frequency, identification of all training requirements and tracking of employees who are covered by these requirements are critical issues.
 - The *HRIS* maintains historical training records by employee, if data is entered into the system. There is no system to identify individuals who should be trained and at what frequency, or to schedule these individuals for training.
 - With the regulatory demands increasing, it is important to coordinate these training efforts to ensure consistent and timely training.
 - Job procedures are a critical element of the training program. Managing the procedures is labor intensive.
-

Strategy:

- Comply with all regulatory training requirements, and ensure that training is coordinated, scheduled, documented and tracked.
 - Incorporate job procedures into all training efforts.
-

Action Plans:

Responsibility:

- | | |
|---|--------|
| 1. Identify all regulated training, who is affected, and what resources will be required to maintain a training compliance effort. | EEP |
| 2. Develop an <i>HRIS</i> scheduling and tracking system, which identifies the required training, frequency and individuals affected. | IS/EEP |
| 3. Implement a scheduled training program. | ER |
| 4. Complete and maintain the job procedure program, and integrate job procedures into all formal training. | ER/FAC |
| 5. Implement a network image processing system for job procedures. | IS/EEP |

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2026230584

APPENDIX M

Patents Related to Obsolescence of the Current Product

2026230585

United States Patent [19]

Ray et al.

[11] Patent Number: 4,800,903

[45] Date of Patent: Jan. 31, 1989

[54] NICOTINE DISPENSER WITH POLYMERIC RESERVOIR OF NICOTINE

[76] Inventors: Jon P. Ray, 12544 Judson Rd., San Antonio, Tex. 78233; James E. Turner, 307 Wayside, San Antonio, Tex. 78213; Michael P. Ellis, 811 River Rd., San Antonio, Tex. 78212; Ronald G. Oldham, 1410 Tarton, San Antonio, Tex. 78231

[21] Appl. No.: 738,120

[22] Filed: May 24, 1985

[51] Int. Cl.⁴ A24D 1/00; A24D 3/08; A24F 1/00

[52] U.S. Cl. 131/273; 131/270; 131/335; 128/202.21

[58] Field of Search 131/332, 270, 273, 331, 131/335, 343, 341; 128/202.21

[56] References Cited

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Primary Examiner—V. Millin

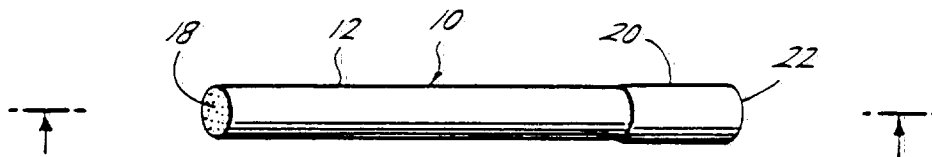
Attorney, Agent, or Firm—Arnold, White & Durkee

[57]

ABSTRACT

A nicotine dispenser comprising a polyolefin porous plug with reversibly retained nicotine therein. The dispenser is mounted in a tubular configuration to provide a cigarette-shaped product adapted to dispense nicotine vapor when air is drawn therethrough. The polymeric reservoir of nicotine comprises a polyolefin, preferably polyethylene or polypropylene, which reversibly absorbs nicotine.

39 Claims, 1 Drawing Sheet



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LAW DEPT.—PATENT DIVISION

FEB 8 1989

2026230586

United States Patent [19]
Ray

[11] Patent Number: 4,813,437

[45] Date of Patent: Mar. 21, 1989

[54] NICOTINE DISPENSING DEVICE AND
METHOD FOR THE MANUFACTURE
THEREOF

[76] Inventor: J. Philip Ray, 2929 Mossrock, Ste.
130, San Antonio, Tex. 78230

[21] Appl. No.: 569,279

[22] Filed: Jan. 9, 1984

[51] Int. Cl.⁴ A24D 1/00; A24F 1/00

[52] U.S. Cl. 131/273; 131/270;
131/335; 128/202.21

[58] Field of Search 131/273, 335, 365, 337;
128/202.21

[56] References Cited

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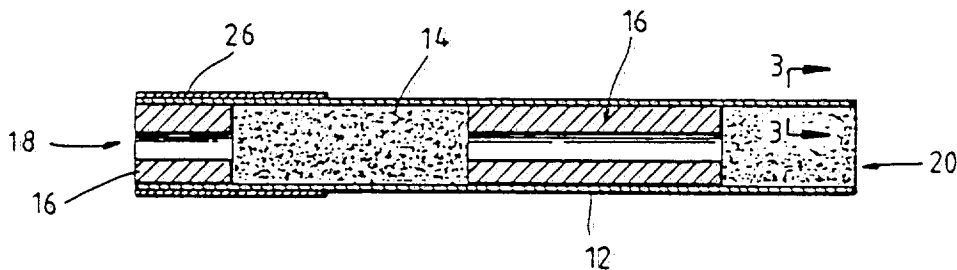
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Arnold, White & Durkee

[57] ABSTRACT

An improved nicotine dispensing device for non-pyrolytic use which is adapted to release nicotine-bearing vapors into air drawn through the device. The device comprises one or more nicotine-bearing sections, one or more insulating sections which are linearly aligned with nicotine-bearing sections and a fluid impermeable housing. The housing retains the nicotine-bearing and insulating sections. This invention also includes a method for the preparation of an improved nicotine dispensing device. The method includes the steps of preparing one or more fluid retaining sections and one or more insulating sections. The fluid retaining sections and insulating sections are linearly arranged and wrapped with a fluid impermeable housing material. A nicotine containing material is then injected into, or incorporated within, the fluid retaining sections.

7 Claims, 2 Drawing Sheets



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LAW DEPT.-PATENT SECTION

MAR 29 1989

NOTED *J. Charles*
R. Ellis
Dougherty
Kent

2026230587

United States Patent [19]
Summers

[11] Patent Number: 4,817,640
[45] Date of Patent: Apr. 4, 1989

[54] HERBAL CHEW AND SNUFF
COMPOSITIONS

[75] Inventor: John K. Summers, Anderson, Ind.
[73] Assignee: Better Life International Life, Inc.,
Stuart, Fla.

[21] Appl. No.: 907,402

[22] Filed: Sep. 12, 1986

[51] Int. CL⁴ A24B 15/18

[52] U.S. CL 131/359; 131/352;
131/369

[58] Field of Search 131/359, 369

[56] References Cited

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| 3,369,551 | 2/1968 | Carrall | 131/359 |
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141-150, year and author unknown.

Primary Examiner—V. Millin

Assistant Examiner—J. Cheng

Attorney, Agent, or Firm—Hoffmann & Baron

[57] ABSTRACT

Compositions and methods for providing tobaccoless herbal chew and snuff products which include an herbal component capable of being encased with a casing material providing a coherent cud in the oral cavity during use. In particular the present invention contemplates the use of a nicotine-free herbal substitute, such as red clover in the case of snuff and dandelion leaf in the case of chew, which can be encased with, among other things, a binder to provide a coherent cud in the mouth during use. As a result of this invention, safe nicotine-free snuff and chew compositions can be provided.

39 Claims, No Drawings

2026230588

with said essential oil-containing herb which maintains said herb in a moist coherent cud during chewing.

2. The chewing composition of claim 1 which further comprises a flavorant and a coloring agent.

3. The chewing composition of claim 2 wherein said flavor component is selected from the group consisting of natural and artificial sweeteners, flavoring agents, spices, fruit flavors, and mixtures thereof.

4. The chewing composition of claim 2 wherein said color component is selected from the group consisting of caramel and other food grade coloring agents.

5. The chewing composition of claim 2 wherein said herb component is present in the composition of the final product in an amount of from about 40% to about 60% by weight, said casing component is present in an amount of from about 8% to about 35% by weight, said flavor component is present in an amount from about 4% to about 26% by weight, and said color component is present in an amount of from about 0.25% to about 5% by weight.

6. The chewing composition of claim 5 wherein said herb component is present in an amount of about 45% to about 55% by weight, said casing component is present in an amount of from about 15% to about 28% by weight, said flavor component is present in an amount of about 8% to about 20% by weight, and said color component is present in an amount of about 0.8% to about 3.0% by weight.

7. The chewing composition of claim 1 wherein said preservative is selected from the group consisting of a salt, powdered dandelion root, echinacea, clove powder, and mixtures thereof.

8. The chewing composition of claim 1 wherein said binder is selected from a group consisting of molasses, corn syrup, hydrogenated starch hydrolysates, and mixtures thereof.

9. The chewing composition of claim 1 wherein said humectant is selected from the group consisting of glycerin, sorbitol, invert sugar, and other moisture-maintaining materials.

10. The chewing composition of claim 1 which further comprises a bio-effecting agent.

11. The chewing composition of claim 10 wherein said bio-effecting agent is selected from the group consisting of mineral supplements, analgesics, antipyretics, antiarrhythmics, ion exchange resins, appetite suppressants, vitamins, anti-inflammatory substances, coronary dilators, cerebral dilators, peripheral vasodilators, anti-infectives, psychotropics, antimanics, stimulants, antihistamines, laxatives, decongestants, gastro-intestinal sedatives, antidiarrheal preparations, anti-anginal drugs, vasodilators, anti-hypertensive drugs, vasoconstrictors and migraine treatments, antibiotics, tranquilizers, antipsychotics, antitumor drugs, anticoagulants and antithrombotic drugs, hypnotics, sedatives, anti-emetics, anti-nauseants, anticonvulsants, neuromuscular drugs, hyper and hypoglycaemic agents, thyroid and antithyroid preparations, diuretics, antispasmodics, uterine relaxants, nutritional additives, antiobesity drugs, anabolic drugs, erythropoietic drugs, antiasthmatics, expectorants, cough suppressants, nucleolytics, anti-uricemic drugs and mixtures thereof.

12. A snuff composition comprising a nicotine-free herb containing essential oils capable of being encased and capable of being processed to a texture which is non-injurious to the surface of the oral cavity, said herb being clover, and a casing material which includes a preservative, a binder, and a humectant for combining

with said essential oil-containing herb which maintains said herb in a moist coherent cud in the mouth during use.

13. The snuff composition of claim 12 wherein said herb is hydrophilic and wherein said casing is adsorptive to said herb.

14. The snuff composition of claim 13 wherein said herb is red clover.

15. The snuff composition of claim 12 wherein said herb component is present in the final product in an amount of from about 25% to about 45% by weight, and said casing component is present in an amount of from about 35% to about 65% by weight.

16. The snuff composition of claim 15 wherein said herb component is present in an amount of from about 30% to about 40%, and said casing component is present in an amount of from about 40% to about 60%.

17. The snuff composition of claim 16 wherein said herb component is present in an amount of from about 32% to about 37% by weight, and said casing component is present in an amount of from about 45% to about 55% by weight.

18. The snuff composition of claim 12 wherein said preservative is selected from the group consisting of a salt, powdered dandelion root, echinacea, clove powder and mixtures thereof.

19. The snuff composition of claim 12 wherein said binder is selected from the group consisting of molasses, corn syrup, hydrogenated starch hydrolysates and mixtures thereof.

20. The snuff composition of claim 12 wherein said humectant is selected from the group consisting of glycerin, sorbitol, invert sugar, and other moisture-maintaining materials.

21. The snuff composition of claim 12 which further comprises a flavorant component, a color component, and an additional non-casing herbal binder component.

22. The snuff of claim 21 wherein said flavor component is present in an amount of from about 0.25% to about 7% by weight, said color component is present in an amount of from about 0.25% to about 5% by weight, and said additional binder component is present in an amount of from about 0.5% to about 5% by weight.

23. The snuff composition of claim 22 wherein said flavor component is present in an amount of from about 1.2% to about 5% by weight, said color component is present in an amount of from about 0.8% to about 3% by weight, and said additional binder component is present in an amount of from about 0.8% to about 3% by weight.

24. The snuff composition of claim 23 wherein said flavor component is present in an amount of from about 2.5% to about 4% by weight, said color component is present in an amount of from about 1.0% to about 1.8% by weight, and said additional binder component is present in an amount of from about 0.1% to about 2.0% by weight.

25. The snuff composition of claim 21 wherein said herbal binder component comprises an ingredient selected from the group consisting of gums, slippery elm, mallow, and mixtures thereof.

26. The process of claim 25 wherein said final moisture level is from about 19% to about 21%.

27. The snuff composition of claim 21 wherein said flavor component is selected from the group consisting of natural and artificial sweeteners, flavor agents, fruit flavors, spices, and mixtures thereof.

2026230589

[54] AEROSOL DEVICE

[75] Inventors: David C. Byram; Gerald W. Teiken;
Ralph D. Whaley, all of St. Paul,
Minn.

[73] Assignee: Minnesota Mining and
Manufacturing Company, St. Paul,
Minn.

[21] Appl. No.: 193,420

[22] Filed: May 12, 1988

[51] Int. Cl.⁴ A61M 11/00; A61M 11/04

[52] U.S. Cl. 128/200.23; 128/200.14;
222/162; 222/402.11; 222/402.12; 222/402.13

[58] Field of Search 128/200.14, 200.23;
222/162; 402.11, 402.12, 402.13

[56] References Cited

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Primary Examiner—Edgar S. Burr

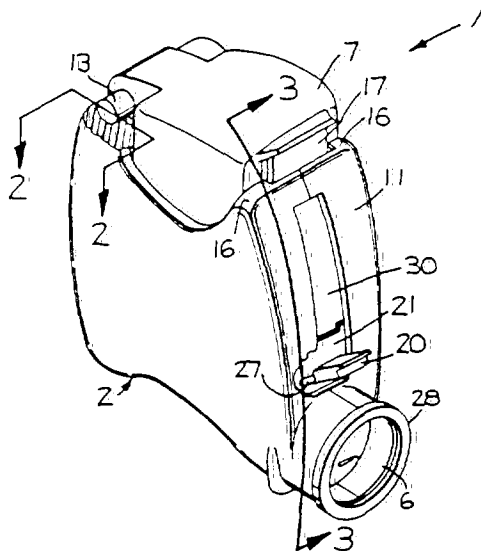
Assistant Examiner—Kimberly L. Asher

Attorney, Agent, or Firm—Donald M. Sell; Walter N.
Kim; Robert W. Sprague

[57] ABSTRACT

The invention is a dispenser for use with aerosol formulations for inhalation therapy. The dispenser is small, conveniently carried, and features means to prevent unintended actuation of the aerosol canister and means to prevent dust and dirt from entering the dispenser during storage.

18 Claims, 3 Drawing Sheets



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2026230590

United States Patent [19]

Hurka et al.

[11] Patent Number: 4,841,964

[45] Date of Patent: Jun. 27, 1989

[54] INHALER

[76] Inventors: Wilhelm Hurka, Am Pfarrfeld 1,
A9851 Lieserbrücke, Austria; Rudolf
A. Hatschek, 3, rue Jacques-Vogt,
Fribourg 5, Switzerland, CH-1700

[21] Appl. No.: 892,197

[22] Filed: Jul. 31, 1986

[30] Foreign Application Priority Data

Aug. 1, 1985 [AT] Austria 2272/85

[51] Int. Cl.⁴ A61M 16/00

[52] U.S. Cl. 128/203.15; 128/203.23;
604/58

[58] Field of Search 128/203.15, 203.23;
604/57, 58; 222/224

[56] References Cited

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Primary Examiner—Edward M. Coven

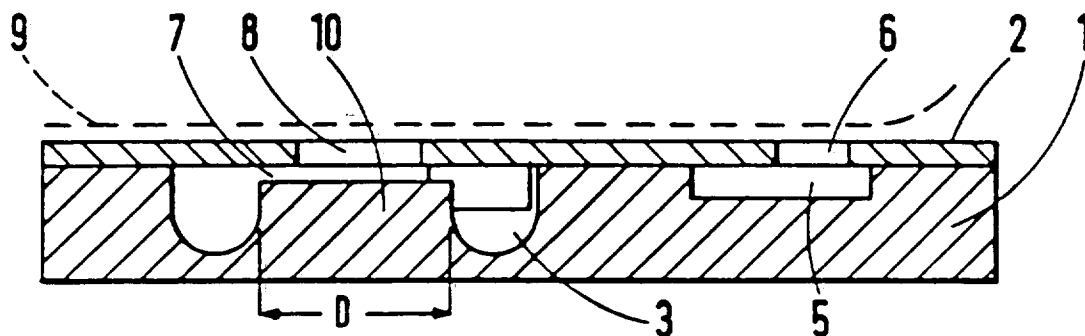
Assistant Examiner—K. M. Reichle

Attorney, Agent, or Firm—Kurt Kelman

[57] ABSTRACT

An inhaler is described for introducing a solid substance in particulate form into the inhaled air of a user. The inhaler comprises a body in which is provided an endless orbital path 3 for one or more balls 4. Air enters the path via an air inlet optionally through an intake conduit. Air leaves the orbital path 3 in a centripetal direction through an air discharge system and an air outlet. The solid substance to be inhaled is provided, preferably in the form of a film, on the surface of the orbital path or on the surface of the ball. A user inhales through the air outlet 8, and this causes air to be drawn into the orbital path through the air inlet. This causes the ball to circulate around the orbital path, in which process solid substance is dislodged and caused to flow with the air out through the outlet.

16 Claims, 4 Drawing Sheets



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LAW DEPT.—PATENT SECTION

MAR 14 1990

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2026230591

United States Patent [19]
Tran

[11] Patent Number: 4,842,598
[45] Date of Patent: Jun. 27, 1989

[54] THERAPEUTIC AGENT DELIVERY SYSTEM
AND METHOD

- [75] Inventor: Loi H. Tran, Wheaton, Ill.
[73] Assignee: Controlled Release Technologies,
Inc., Batavia, Ill.
[21] Appl. No.: 137,761
[22] Filed: Dec. 24, 1987

Related U.S. Application Data

- [62] Division of Ser. No. 679,128, Dec. 6, 1984, Pat. No.
4,715,850.
[51] Int. Cl.⁴ A61M 5/00
[52] U.S. Cl. 604/891.1; 604/131;
204/130
[58] Field of Search 604/82, 83, 86, 87,
604/93, 126, 891.1, 131; 204/130, 131

[56] References Cited

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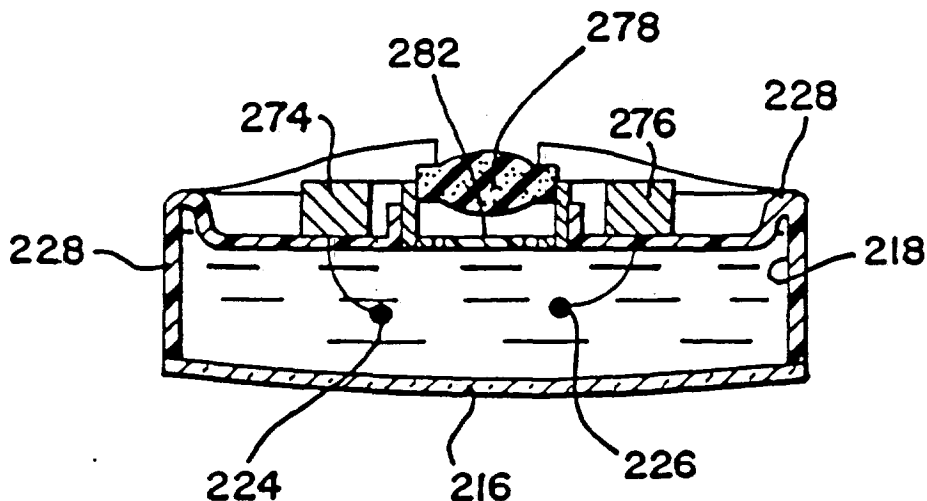
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Primary Examiner—Stephen C. Pellegrino
Attorney, Agent, or Firm—Olson & Hierl

[57] ABSTRACT

A method and apparatus for controllably administering a therapeutic agent to a patient is disclosed. The method and apparatus uses an electromotive force between an anode and a cathode to cause the therapeutic agent to migrate through a semipermeable membrane. The therapeutic agent is then delivered to the patient.

6 Claims, 5 Drawing Sheets



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2026230592

United States Patent [19]

Sperry

[11] Patent Number: 4,852,561

[45] Date of Patent: Aug. 1, 1989

[54] INHALATION DEVICE

[76] Inventor: Charles R. Sperry, 113 Clinton St.,
Springfield, Vt. 05156

[21] Appl. No.: 224,883

[22] Filed: Jul. 27, 1988

[51] Int. Cl.⁴ A61M 15/00

[52] U.S. Cl. 128/200.23; 128/203.15;
128/200.18

[58] Field of Search 128/200.23, 200.18,
128/203.15, 203.23, 203.13, 203.12

[56] References Cited

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Primary Examiner—Edgar S. Burr

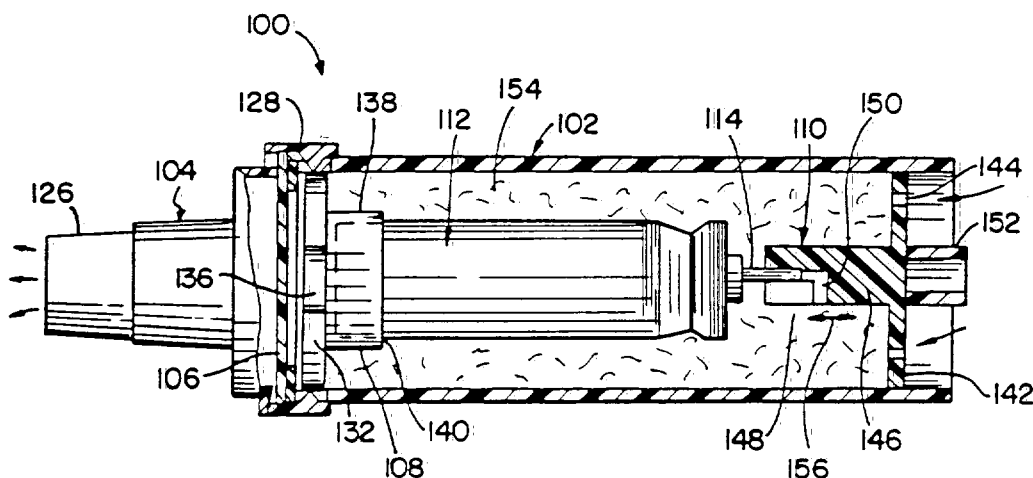
Assistant Examiner—Kimberly L. Asher

Attorney, Agent, or Firm—Lerner, David, Littenberg,
Krumholz & Mentlik

[57] ABSTRACT

An inhalation device in the nature of a metered dose inhaler is designed specifically for existing respiratory drugs to be employed in hospitals and/or by patients at home. The device is constructed of a housing which defines an aerosol chamber for a metered dose of a medicant containing aerosol from a cartridge. The cartridge is supported wholly within the aerosol chamber. An actuating valve mechanism is slidably receiving within an open end of the housing and includes a projecting portion to which a compressive force may be applied. Upon application of the compressive force, for example, by forcing the open end of the housing against a supporting surface, the outlet valve mechanism of the cartridge is activated to dispense a metered dose of medicant into the aerosol chamber in the form of an aerosol.

26 Claims, 3 Drawing Sheets



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each file - Thompson

2026230593

United States Patent [19]

Tamaoki et al.

[11] Patent Number: 4,865,056

[45] Date of Patent: Sep. 12, 1989

[54] EASILY BREAKABLE PLASTIC CAPSULE
AND A WATER FILTER FOR A CIGARETTE
USING THE SAME

[75] Inventors: Akimichi Tamaoki; Shinichiro
Tanaka; Morio Kondo, all of
Yokohama; Masami Kawata, Tokyo;
Ichiro Hirose, Tokyo; Hiroshi
Uematsu, Tokyo; Kazuto Minami,
Yokohama; Mitsuyuki Kobiyama,
Matsudo, all of Japan

[73] Assignees: Japan Tobacco Inc.; DAI Nippon
Printing Co., Ltd., both of Tokyo,
Japan

[21] Appl. No.: 145,283

[22] Filed: Jan. 19, 1988

[30] Foreign Application Priority Data

Jan. 23, 1987 [JP] Japan 62-12518
May 6, 1987 [JP] Japan 62-108894

[51] Int. Cl.⁴ A24D 3/06; B65D 41/02

[52] U.S. Cl. 131/337; 131/173;
220/265; 220/207

[58] Field of Search 131/173, 335, 337;
220/207, 359, 265, 266, 89 R, 89 A; 222/541,
107, 95; 401/132

[56] References Cited

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Primary Examiner—V. Millin

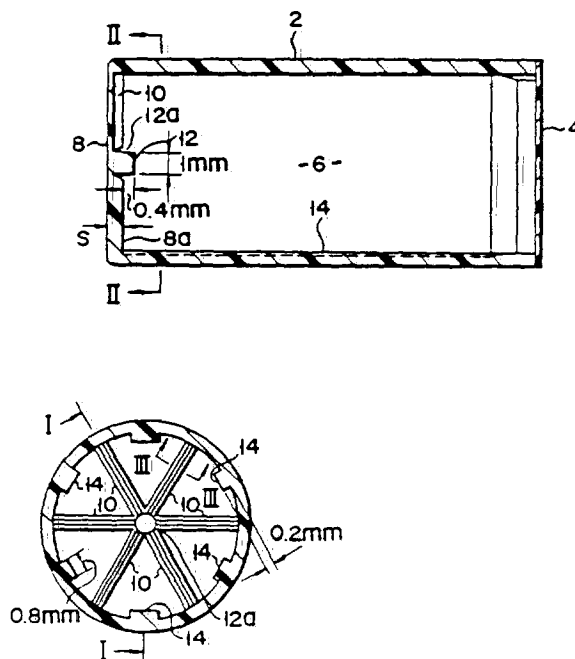
Assistant Examiner—J. Welsh

Attorney, Agent, or Firm—Nixon & Vanderhye

[57] ABSTRACT

An easily breakable plastic capsule according to the present invention comprises a hollow cylindrical body capable of elastic deformation. The body is packed with a fluid material. An end wall of the body is formed with a plurality of radially extending grooves. When the body is deformed elastically, the bottom walls of the grooves are broken, so that the material flows out of the body through tears in the grooves. A water filter according to the present invention comprises a casing, made of paper and coupled to a cigarette, and a filter member and the capsule arranged in the casing. The grooved end wall of the capsule is situated in close vicinity to the filter member.

25 Claims, 4 Drawing Sheets



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2026230594

United States Patent [19]

Drews et al.

[11] Patent Number: 4,877,989

[45] Date of Patent: Oct. 31, 1989

[54] ULTRASONIC POCKET ATOMIZER

[75] Inventors: Wolf-Dietrich Drews, Lichtenfels;
Klaus Van Der Linden, Kronach;
Martin Rüttel, Grub a. Forst; Jürgen
Friedrich, Neuensorg, all of Fed.
Rep. of Germany

[73] Assignee: Siemens Aktiengesellschaft, Munich,
Fed. Rep. of Germany

[21] Appl. No.: 296,846

[22] Filed: Jan. 12, 1989

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 84,413, Aug. 10, 1987,
abandoned.

[30] Foreign Application Priority Data

Aug. 11, 1986 [DE] Fed. Rep. of Germany 3627222

[51] Int. Cl.⁴ H01L 41/08

[52] U.S. Cl. 310/323; 310/317;
128/200.16; 239/102.2

[58] Field of Search 310/321-325,
310/317; 239/102.2; 128/200.14, 200.16

[56] References Cited

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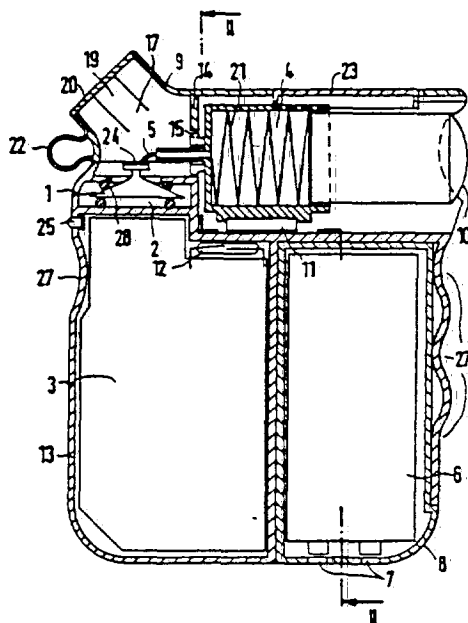
2557958 6/1977 Fed. Rep. of Germany .
2101500 1/1983 United Kingdom 128/200.16

Primary Examiner—Mark O. Budd
Attorney, Agent, or Firm—Kenyon & Kenyon

[57] ABSTRACT

An ultrasonic pocket-size atomizer comprises a housing including a first portion and a second portion detachably connected thereto. A vibration generation mechanism is mounted liquid-tight in the first portion of the housing for generating an oscillation with a frequency between 1 and 5 Mhz. The vibration generation mechanism includes a piezoelectric assembly and an electronic circuit operatively connected to the assembly for energizing the assembly and causing the assembly to vibrate. A power source including a storage battery is removably and rechargeably disposed in the first portion of the housing for supplying electric current to the electronic circuit. A cartridge is provided for containing liquid to be atomized, the cartridge being movably disposed in the second portion of the housing. An activation mechanism is provided for automatically activating the electronic circuit upon motion of the movable section of the cartridge, the activation mechanism including a magnet attached to the movable section of the cartridge so as to move therewith. The activation mechanism further includes a switch operatively connected to the electronic circuit and operable by the magnet upon a shift in the position thereof during motion of the movable section of the cartridge.

18 Claims, 3 Drawing Sheets



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United States Patent [19]

Daeges et al.

[11] Patent Number: 4,888,516

[45] Date of Patent: Dec. 19, 1989

[54] PIEZOELECTRICALLY EXCITABLE RESONANCE SYSTEM

[75] Inventors: Johannes Daeges, Lichtenfels; Klaus
Van Der Linden, Kronach, both of
Fed. Rep. of Germany

[73] Assignee: Siemens Aktiengesellschaft, Berlin &
Munich, Fed. Rep. of Germany

[21] Appl. No.: 222,266

[22] Filed: Jul. 21, 1988

[30] Foreign Application Priority Data

Jul. 22, 1987 [DE] Fed. Rep. of Germany 3724629

[51] Int. Cl.⁴ H01L 41/08

[52] U.S. Cl. 310/323; 239/102.2;
310/335

[58] Field of Search 310/321-323,
310/325, 328, 335, 336, 337, 369; 239/102.1,
102.2; 134/1

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3616713 5/1986 Fed. Rep. of Germany .

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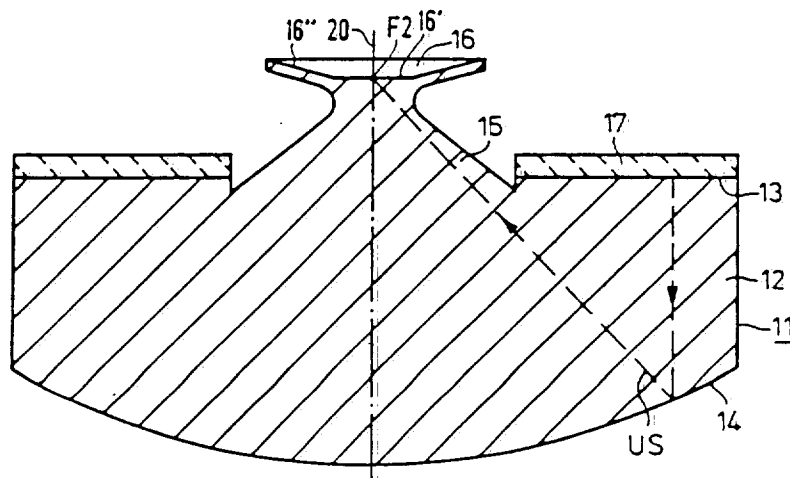
Primary Examiner—Mark O. Budd

Attorney, Agent, or Firm—Kenyon & Kenyon

[57] ABSTRACT

For generating liquid droplets which may pass into the lungs of a person, a resonance system is used which contains a rotation-symmetrical metal body with a disc-shaped base plate, a working plate, a neck connecting the working plate to the base plate as well as a piezoceramic vibrator. The vibrator is coupled to the plane base surface which extends perpendicularly to the symmetry axis of the metal body. The base plate is also provided with a parabolic reflector surface. The center of the working plate is in the vicinity of the reflector focal point, optionally mirrored with respect to the base area of the base plate, of the parabolic reflector surface. In this design, ultrasound waves excited by the vibrator are focused into the region of the working plate, thereby atomizing a liquid which is held by the working plate.

12 Claims, 1 Drawing Sheet



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United States Patent [19]

Wetterlin et al.

[11] Patent Number: 4,907,583

[45] Date of Patent: Mar. 13, 1990

- [54] DEVICE IN POWDER INHALATORS
- [75] Inventors: Kjell I. L. Wetterlin, S Sandby,
Sweden; Risto Virtanen, Nurmijärvi,
Finland; Jan A. R. Andersson, S
Sandby, Sweden
- [73] Assignee: Aktiebolaget Draco, Lund, Sweden
- [21] Appl. No.: 287,611
- [22] Filed: Dec. 16, 1988

Related U.S. Application Data

- [63] Continuation of Ser. No. 19,057, Feb. 26, 1987, abandoned.

Foreign Application Priority Data

Mar. 7, 1986 [SE] Sweden 86010600

- [51] Int. Cl.⁴ A61M 15/00
- [52] U.S. Cl. 128/203.15; 128/203.12;
128/200.18
- [58] Field of Search 128/200.18, 200.21,
128/203.12, 203.15, 203.22-203.24, 204.13;
239/461, 467, 487, 489, 500-501, 518-519;
222/345, 349

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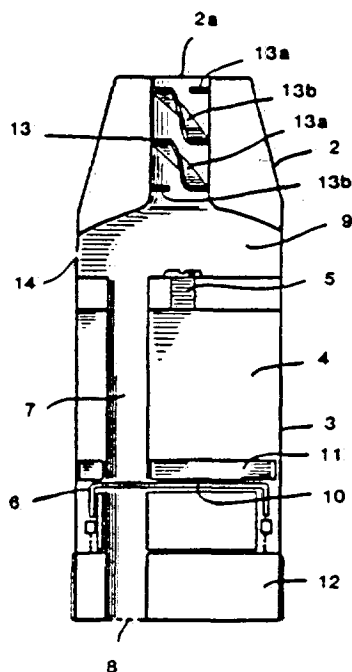
- 2152819 8/1985 United Kingdom 128/203.15

Primary Examiner—Angela D. Sykes
Attorney, Agent, or Firm—White & Case

[57] ABSTRACT

Device in a previously known powder inhalator intended for inhalation of an air flow which contains pharmacologically active compound in micronized form. The powder inhalator comprises a nozzle unit (2) with a nozzle aperture (2a) as well as a container unit (3) with a releasing or dosing unit (6) for delivering the active compound. The air flow generated by inhalation is at least partly aspirated through an air conduit (7) located in the container unit (3), which conduit extends from an air inlet (8), communicating with the environment, via said releasing or dosing unit (6), up to said nozzle unit (2). According to the invention, deflector devices are stationarily arranged in the container unit (3) and/or in the nozzle unit (2), said deflector devices, for example in the shape of a helical channel portion (13), being arranged to create a powerful deflecting movement for the purpose of disrupting said powder particles into the respirable particle size distribution (less than 5 μ m).

10 Claims, 5 Drawing Sheets



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2026230597

United States Patent [19]

Ray et al.

[11] Patent Number: 4,907,605

[45] Date of Patent: Mar. 13, 1990

[54] ORAL TABACCO SUBSTITUTE

[75] Inventors: Jon P. Ray; Michael P. Ellis, both of
San Antonio, Tex.

[73] Assignee: Advanced Tobacco Products, Inc.,
San Antonio, Tex.

[21] Appl. No.: 303,036

[22] Filed: Jan. 25, 1989

Related U.S. Application Data

[63] Continuation of Ser. No. 771,246, Aug. 30, 1985, abandoned, which is a continuation-in-part of Ser. No. 738,120, May 24, 1985, abandoned.

[51] Int. Cl.⁴ A24B 47/00

[52] U.S. Cl. 131;270; 131/273;
131/355

[58] Field of Search 131/270, 335, 359, 369

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3,757,798 9/1973 Lambert .
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3,952,741 4/1976 Baker .
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4,284,089 8/1981 Ray .
4,635,651 1/1987 Jacobs 131/329

Primary Examiner—V. Millin

Attorney, Agent, or Firm—Arnold, White & Durkee

[57] ABSTRACT

An oral nicotine dispenser comprising nicotine or a nicotine salt and a water-insoluble material capable of sorbing nicotine. The dispenser is able to slowly release the sorbed nicotine or nicotine salt in an oral environment. The water insoluble material may consist essentially of paper or a polymeric substance able to absorptively contain nicotine.

The water-insoluble material may be a substance such as paper or cellulose acetate. A water-insoluble polymeric substance such as a polyolefin, most preferably polyethylene or polypropylene may be used as the nicotine-holding material.

4 Claims, No Drawings

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B. Hardy

2026230598

United States Patent [19]

Lilja et al.

[11] Patent Number: 4,907,606

[45] Date of Patent: Mar. 13, 1990

[54] TOBACCO COMPOSITIONS, METHOD AND
DEVICE FOR RELEASING ESSENTIALLY
PURE NICOTINE

[75] Inventors: Jan E. Lilja, Kristianstad; Sven E. L.
Nilsson, Helsingborg, both of
Sweden

[73] Assignee: AB Leo, Helsingborg, Sweden

[21] Appl. No.: 148,701

[22] Filed: Jan. 26, 1988

Related U.S. Application Data

[62] Division of Ser. No. 882,929, filed as PCT
SE85/00424 on Oct. 29, 1985, published as
WO86/02528 on May 9, 1986, Pat. No. 4,776,353.

Foreign Application Priority Data

Nov. 1, 1984 [SE] Sweden 8405479

[51] Int. CL⁴ A24D 1/00; A24F 1/00

[52] U.S. CL 131/273; 131/194

[58] Field of Search 131/330, 329, 273, 270,
131/194, 198.1, 360

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4,735,217 4/1988 Garth .

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1185887 3/1970 United Kingdom 131/360
1316987 5/1973 United Kingdom .

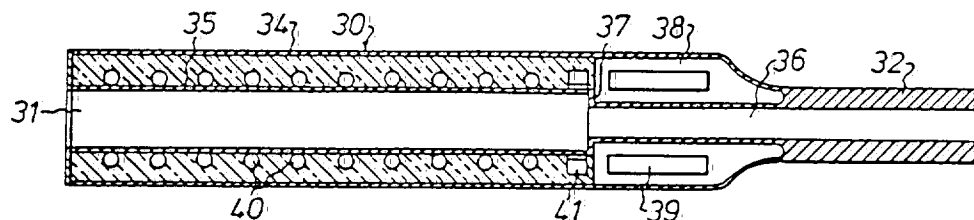
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Gordon W. Hueschen

[57] ABSTRACT

Novel tobacco compositions which when subjected to an elevated temperature below the combustion temperature the tobacco liberates essentially pure nicotine. The invention also includes a method for liberating nicotine from the compositions and a device for carrying out the method.

9 Claims, 2 Drawing Sheets



(Division of earlier patent)

2026230599

United States Patent [19]
Govil et al.

[11] Patent Number: 4,908,213
[45] Date of Patent: Mar. 13, 1990

[54] TRANSDERMAL DELIVERY OF NICOTINE

[75] Inventors: Sharad K. Govil, Plantation; Paul Kohlman, Deerfield Beach, both of Fla.

[73] Assignee: Schering Corporation, Kenilworth, N.J.

[21] Appl. No.: 313,103

[22] Filed: Feb. 21, 1989

[51] Int. Cl.⁴ A61L 15/00; A61B 5/00

[52] U.S. Cl. 424/447; 424/449;
128/156

[58] Field of Search 424/422-426,
424/447, 448, 449; 128/156

[56] References Cited

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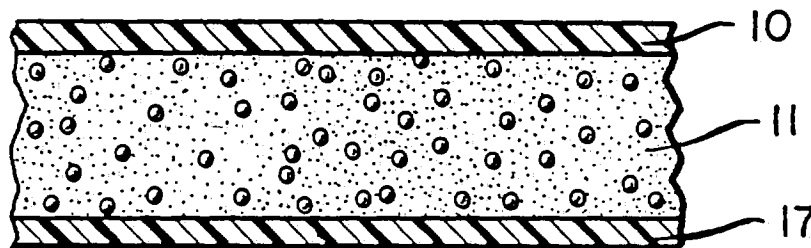
Primary Examiner—Nancy A. B. Swisher

Attorney, Agent, or Firm—Anita W. Magatti; James R. Nelson; Stephen I. Miller

[57] ABSTRACT

A transdermal nicotine patch comprising an antipruritic to counteract pruritis observed with the transdermal administration of nicotine is disclosed. The patch can be any conventional patch type, e.g., reservoir, adhesive or polymeric matrix.

14 Claims, 1 Drawing Sheet



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United States Patent [19]

Vromen et al.

[11] Patent Number: 4,911,181

[45] Date of Patent: Mar. 27, 1990

[54] PLASTIC MOUTHPIECE FOR SIMULATED SMOKING

[75] Inventors: Zwi Vromen, Tel Aviv; Joseph Gross, Moshav Mazor, both of Israel

[73] Assignee: Inventor's Funding Company, Ltd., Tel Aviv, Israel

[21] Appl. No.: 222,534

[22] Filed: Jul. 21, 1988

[30] Foreign Application Priority Data

Sep. 8, 1987 [IL] Israel 83826

[51] Int. Cl.⁴ A24F 47/00

[52] U.S. Cl. 131/273; 131/270

[58] Field of Search 128/200.23; 202.21, 128/760, 765; 131/270, 271, 272, 273; 604/133, 135, 142, 146

[56] References Cited

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Primary Examiner—V. Millin

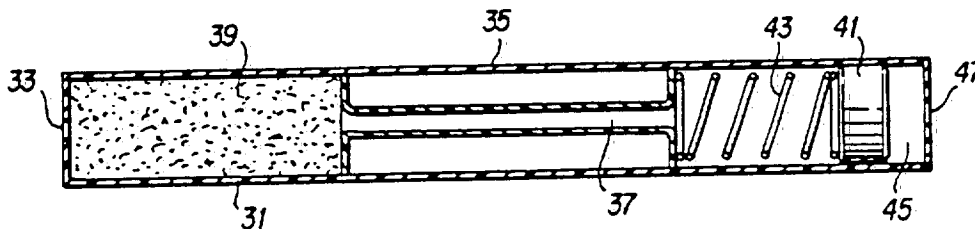
Assistant Examiner—D. F. Crosby

Attorney, Agent, or Firm—Oblon, Spivak, McClelland, Maier & Neustadt

[57] ABSTRACT

The invention includes a cigarette like device which enables the user to experience the taste and aroma as well as the tactile sensations of smoking a tobacco cigarette—but without the presence of smoke, without any combustion, and without inhalation of harmful carcinogenic substances (e.g. tars) into the user's lungs. The device consists of a plastic mouthpiece containing a plug of chewing tobacco connected to a plastic tube with an axial duct, extending to a sealed end, where there is located a pumping member in the form of a flexible accordion-like, or bellows-type configuration or a spring-loaded ball or position. In a further embodiment, the device consists of a conventional mouthtip filter, or a tubular body with a flexible collapsible side wall sealed at the far end, and a tobacco insert. In the device, repeated suction cycles by the user are utilized to initially draw the user's saliva through the tobacco insert to flavor it with nicotine, and then to recirculate this saliva back to the user's mouth on successive suction cycles, allowing the user to taste and smell the nicotine. Inserts other than tobacco can be used in the device (e.g. menthol, various medications and the like).

11 Claims, 2 Drawing Sheets



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2026230601

United States Patent [19]

Potter et al.

[11] Patent Number: 4,913,168

[45] Date of Patent: Apr. 3, 1990

[54] FLAVOR DELIVERY ARTICLE

[75] Inventors: Dennis L. Potter, Kernersville; Mark L. Raker, Clemmons; Henry T. Ridings, Lewisville; Andrew J. Sensabaugh, Jr., Winston-Salem; Amos E. Westmoreland, Winston-Salem; Donna K. Woods, Winston-Salem; Chandra K. Banerjee, Pfafftown, all of N.C.

[73] Assignee: R. J. Reynolds Tobacco Company, Winston-Salem, N.C.

[21] Appl. No.: 278,060

[22] Filed: Nov. 30, 1988

[51] Int. Cl.⁴ A24F 1/00

[52] U.S. Cl. 131/194; 131/273; 131/360

[58] Field of Search 131/273, 194-197

[56] References Cited

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276250 6/1967 Australia
8602528 5/1986 PCT Int'l Appl.

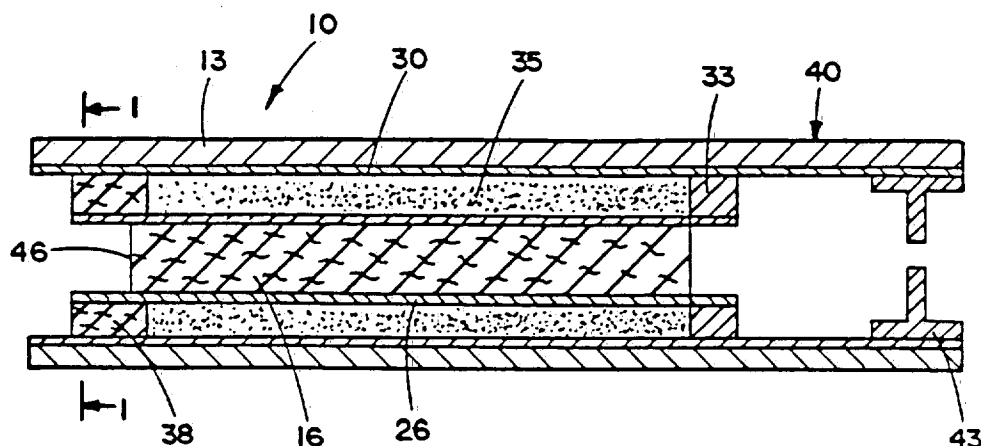
Primary Examiner—V. Millin

Assistant Examiner—Jennifer L. Doyle

[57] ABSTRACT

A flavor delivery article provides volatilized flavor by heating a flavor carrying substrate, but not burning any material. A heat source which includes a metal oxide (e.g., calcium oxide), an anhydrous metal sulfate (e.g., magnesium sulfate), an inorganic salt and a sugar, generates heat upon contact of water therewith. The heat produced by the heat source heats flavor in a heat exchange relationship therewith. Flavors volatilize and are drawn into the mouth of the user of the article. Typical heat sources heat the flavor to a temperature within 70° C. to 200° C. for 4 to 8 minutes.

69 Claims, 1 Drawing Sheet



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2026230602

[54] SMOKING ARTICLE

[75] Inventor: Leroi K. Templeton, Louisville, Ky.

[73] Assignee: Brown & Williamson Tobacco Corporation, Louisville, Ky.

[21] Appl. No.: 325,330

[22] Filed: Mar. 17, 1989

[51] Int. Cl.⁴ A24D 3/04

[52] U.S. Cl. 131/194; 131/359;
131/361; 131/364

[58] Field of Search 131/198 R, 198.1, 359,
131/361, 364, 194

[56] References Cited

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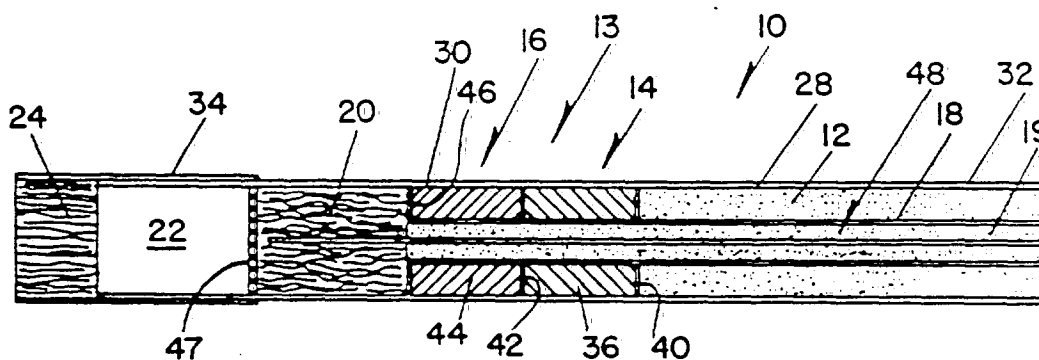
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Charles G. Lamb

[57] ABSTRACT

A smoking article includes a fuel rod, an insulation section at one end of the fuel rod, a tobacco plug at the end of the insulation return, a cooling chamber at the end of the insulation section, and a filter at the end of the chamber. A tube extends concentrically through the fuel rod to the tobacco plug. The tube is filled with an air permeable substrate including an aerosol generating substance. A heat conducting strip extends concentrically in the substrate in the tube and into the tobacco plug.

17 Claims, 1 Drawing Sheet



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United States Patent [19]

Potter et al.

[11] Patent Number: 4,917,119

[45] Date of Patent: Apr. 17, 1990

[54] DRUG DELIVERY ARTICLE

[75] Inventors: Dennis L. Potter, Kernersville; Mark L. Raker, Clemmons; Henry T. Ridings, Lewisville; Andrew J. Sensabaugh, Jr., Winston-Salem; Amos E. Westmoreland, Winston-Salem; Donna K. Woods, Winston-Salem; Chandra K. Banerjee, Pfafftown, all of N.C.

[73] Assignee: R. J. Reynolds Tobacco Company, Winston-Salem, N.C.

[21] Appl. No.: 277,731

[22] Filed: Nov. 30, 1988

[51] Int. Cl.⁴ A61M 15/06

[52] U.S. Cl. 131/273; 131/194; 128/202.21; 128/203.15; 128/204.13; 128/200.14; 128/204.17

[58] Field of Search 131/273, 196, 194, 195, 131/197; 128/202.21, 203.12; 203.13, 203.15, 203.17, 203.26, 204.13, 200.14, 200.23, 200.24, 204.17, 202.27

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4,149,548 4/1979 Bradshaw .
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4,284,089 8/1981 Ray .
4,338,098 7/1982 Yamaji .
4,393,884 7/1983 Jacobs .
4,574,051 3/1986 Matthews et al. .
4,774,971 10/1988 Vieten .

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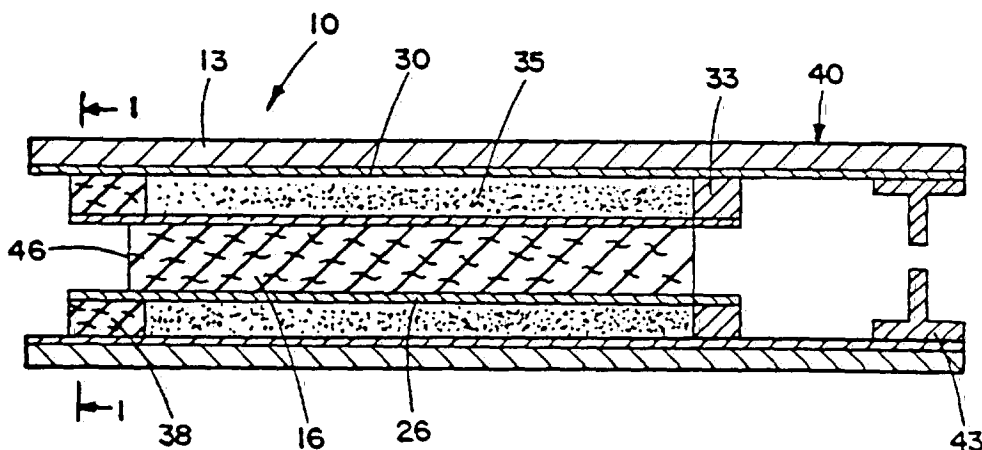
276250 6/1967 Australia .
8602528 5/1986 PCT Int'l Appl. .

Primary Examiner—V. Millin

[57] ABSTRACT

A drug delivery article provides a dose of a volatilized drug by heating a drug carrying substrate, but not burning any material. A heat source which includes a metal oxide (e.g., calcium oxide), an anhydrous metal sulfate (e.g., magnesium sulfate), an inorganic salt and a sugar, generates heat upon contact of water therewith. The heat produced by the heat source heats the drug in a heat exchange relationship therewith. The drug volatilizes and is drawn into the mouth of the user of the article. Typical heat sources heat the drug to a temperature within 70° C. to 200° C. for 4 to 8 minutes.

70 Claims, 1 Drawing Sheet



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2026230604

United States Patent [19]
Hill

[11] Patent Number: 4,917,120

[45] Date of Patent: Apr. 17, 1990

[54] NICOTINE IMPACT MODIFICATION

[75] Inventor: Ira D. Hill, Locust, N.J.

[73] Assignee: Advanced Tobacco Products, Inc.,
San Antonio, Tex.

[21] Appl. No.: 308,936

[22] Filed: Feb. 7, 1989

Related U.S. Application Data

[63] Continuation of Ser. No. 866,073, May 21, 1986, abandoned.

[51] Int. CL⁴ A24D 1/00; A24F 1/00

[52] U.S. CL 131/271; 131/273;
546/281

[58] Field of Search 131/270-271,
131/272, 273, 335; 546/281; 514/343

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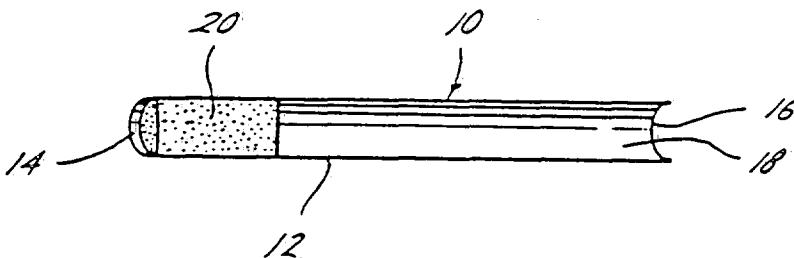
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Arnold, White & Durkee

[57] ABSTRACT

Compositions comprising nicotine and a volatile nicotine-miscible substance may be used to create sources of modulated nicotine vapor. The modulation of nicotine vapor may be one of quantity or of perceived physiological impact or a combination of both. The substance should have a volatility somewhat similar to that of nicotine and have a normal boiling point between about 175° C. and about 275° C. These compositions may be placed in the nicotine reservoir of a personal oral nicotine inhaler. Esters are preferred nicotine miscible substances, particularly when substantially flavorless and generally recognized as safe for human consumption. Nicotine and nicotine-miscible substance in a weight/weight ratio between about 0.5 and 40.0 are emplaced in a nicotine reservoir, for example absorbed in a porous polyethylene item, for insertion into the tubular passageway of a smokeless cigarette.

11 Claims, 2 Drawing Sheets



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LAW DEPT.—PATENT SECTION

APR 26 1990

NOTED
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Ted Sanders
J. Charles

2026230605

[54] SMOKING ARTICLE

[75] Inventors: Tilford F. Riehl; Robert R. Johnson,
both of Louisville, Ky.

[73] Assignee: Brown & Williamson Tobacco
Corporation, Louisville, Ky.

[21] Appl. No.: 281,583

[22] Filed: Dec. 9, 1988

[51] Int. Cl.⁴ A24B 15/28; A24D 1/18

[52] U.S. Cl. 131/364; 131/361;
131/360; 131/194

[58] Field of Search 131/364, 360, 361, 359,
131/369, 194

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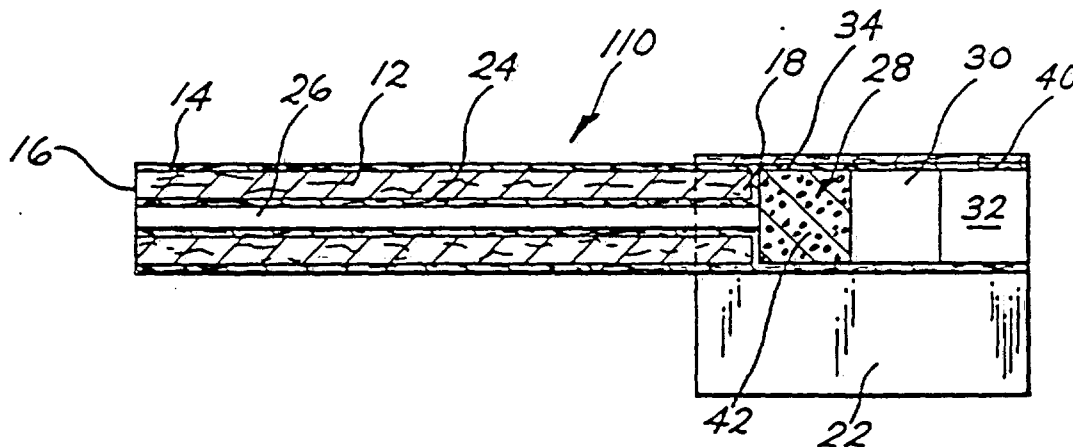
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Charles G. Lamb

[57] ABSTRACT

A smoking article includes a tobacco column with a gas impermeable tube concentrically located in the tobacco column. The tube is filled with a granular material which is coated with an aerosolizing material. A first chamber is located at one end of the tobacco column with its inlet end in gas flow communication only with the tube, a tobacco rod is located with its inlet end at the discharge end of the first channel, and a second chamber is located in gas flow communication with the discharge end of the tobacco rod. The discharge end of the second chamber is open for discharging gas into the smoker's mouth.

9 Claims, 1 Drawing Sheet



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LAW DEPT.—PATENT SECTION

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2026230606

United States Patent [19]

Rose et al.

[11] Patent Number: 4,920,989

[45] Date of Patent: May 1, 1990

[54] METHOD AND APPARATUS FOR AIDING
IN THE REDUCTION OF INCIDENCE OF
TOBACCO SMOKING

[75] Inventors: Jed E. Rose, Venice; Murray E.
Jarvik, Santa Monica; Karce D. Rose,
Healdsburg, all of Calif.

[73] Assignee: Regents of the University of
California, Alameda, Calif.

[21] Appl. No.: 157,536

[22] Filed: Feb. 19, 1988

Related U.S. Application Data

[62] Division of Ser. No. 727,525, Apr. 25, 1985.

[51] Int. CL⁵ A24F 47/00; A61K 9/00

[52] U.S. CL 131/270

[58] Field of Search 514/314; 604/896, 897,
604/46; 131/270

[56] References Cited

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Primary Examiner—V. Millin

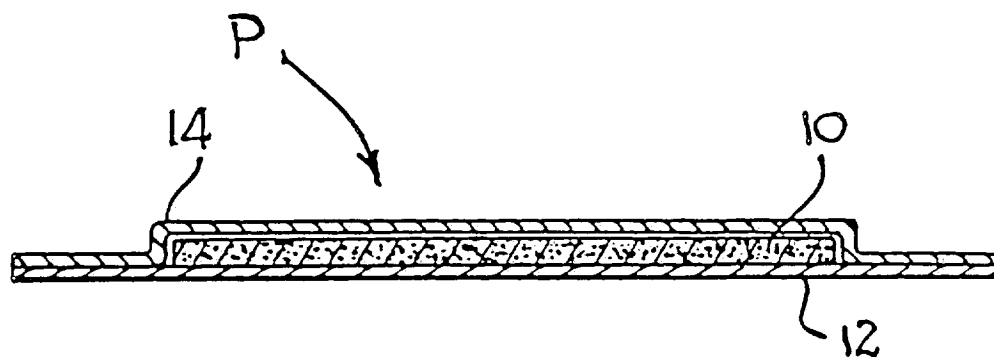
Assistant Examiner—J. L. Doyle

Attorney, Agent, or Firm—Robert J. Schaap

[57] ABSTRACT

A method of aiding in the reduction of incidence of
tobacco smoking. The method comprises applying a
patch containing nicotine to the skin of a person with
whom smoking reduction is desired and allowing the
nicotine to transdermally migrate into the person's
bloodstream to achieve a desired systemic nicotine
level. The method also comprises the simultaneous ad-
ministration of a nicotine containing aerosol spray to
the oral cavity of the user in order to provide the de-
sired sensations in the respiratory tract to which the
user is accustomed from normal tobacco smoke. A com-
bination of the spray and transdermal patch is also pro-
vided such that an occlusive patch is applied to the skin
of the person with whom smoking reduction is desired
and the nicotine containing aerosol spray is delivered to
the oral cavity simultaneously with the application of
the nicotine from the patch.

29 Claims, 3 Drawing Sheets



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LAW DEPT. PATENT SECTION

MAY 7 - 1990

J. Charles

C. Ellis

United States Patent [19]

Sibalis

[11] Patent Number: 4,921,475

[45] Date of Patent: May 1, 1990

[54] TRANSDERMAL DRUG PATCH WITH
MICROTUBES

[75] Inventor: Dan Sibalis, Stony Brook, N.Y.

[73] Assignee: Drug Delivery Systems Inc., New
York, N.Y.

[21] Appl. No.: 196,664

[22] Filed: May 20, 1988

Related U.S. Application Data

[60] Division of Ser. No. 922,296, Oct. 23, 1986, abandoned,
which is a division of Ser. No. 839,050, Mar. 12, 1986,
Pat. No. 4,640,689, which is a continuation of Ser. No.
702,486, Feb. 19, 1985, abandoned, which is a continua-
tion-in-part of Ser. No. 660,192, Oct. 12, 1984, Pat. No.
4,622,031, which is a continuation-in-part of Ser. No.
524,252, Aug. 18, 1983, Pat. No. 4,557,723.

[51] Int. Cl.³ A61N 1/30

[52] U.S. Cl. 604/20; 128/798;
128/802; 128/640

[58] Field of Search 128/639, 640, 641, 798,
128/802, 803; 604/20

[56] References Cited

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Primary Examiner—Max Hindenburg

Assistant Examiner—Randy Shay

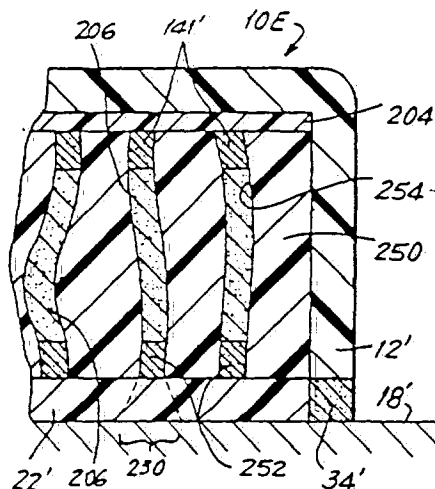
Attorney, Agent, or Firm—Lackebach Siegel Marullo &
Aronson

[57] ABSTRACT

A transdermal drug patch for delivering at least one
drug to a patient through the skin comprises:

- (a) at least two electrodes forming the patch and separated from each other by an insulator;
- (b) a circuit including an electrical power source for supplying power to and electrically connected to the electrodes at a conductive element; and
- (c) drug reservoir means in the form of a plurality of microtubes separated from and insulated from each other extending from a conductive element at one end to the surface of the patch interfacing with the patient at the other end of the microtube.

20 Claims, 4 Drawing Sheets



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MAY 29 1990

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2026230608

United States Patent [19]

Brooks et al.

[11] Patent Number: 4,922,901

[45] Date of Patent: May 8, 1990

[54] DRUG DELIVERY ARTICLES UTILIZING ELECTRICAL ENERGY

[75] Inventors: Johnny L. Brooks; Donald L. Roberts, both of Winston-Salem; Jerry S. Simmons, Rural Hall, all of N.C.

[73] Assignee: R. J. Reynolds Tobacco Company, Winston-Salem, N.C.

[21] Appl. No.: 241,641

[22] Filed: Sep. 8, 1988

[51] Int. Cl.³ A61M 16/00; A61M 15/06; A24K 47/00

[52] U.S. Cl. 128/203.26; 128/202.27; 128/203.27; 128/204.13; 128/204.17; 128/203.12; 131/273; 131/329

[58] Field of Search 128/202.21, 203.12, 128/203.13, 203.15, 203.17, 203.26, 203.27, 204.13, 200.14, 200.23, 200.24, 204.17, 202.27

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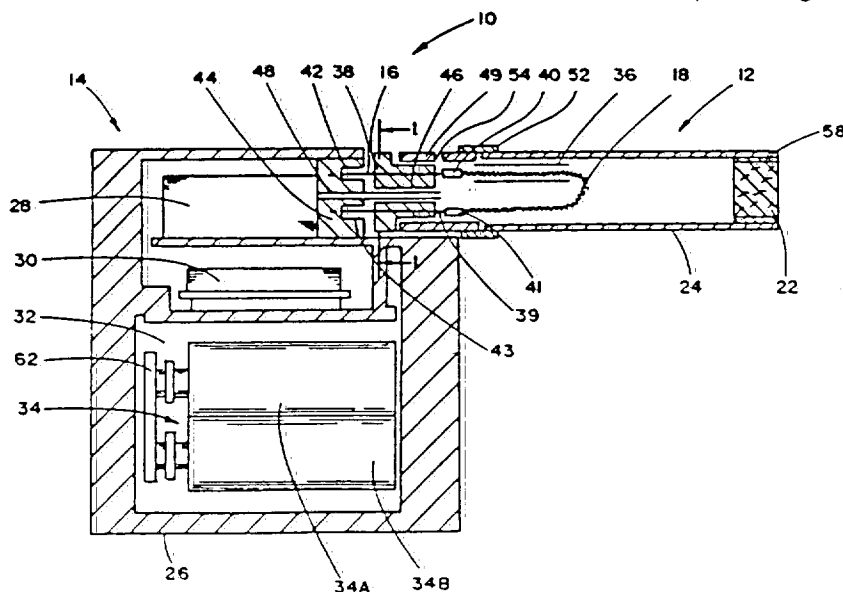
Primary Examiner—Edgar S. Burr

Assistant Examiner—Kimberly L. Asher

[57] ABSTRACT

Drug delivery articles employ an electrical resistance heating element and an electrical power source to provide a dose of a drug in aerosol form. The articles advantageously comprise a disposable portion and a reusable controller. The disposable portion, normally includes a drug and an air permeable resistance heating element having a surface area greater than 1 m²/g., which usually carries an aerosol forming material. The reusable controller normally includes a puff-actuated current actuation means, a time-based current regulating means to control the temperature of the heating element, and a battery power supply.

136 Claims, 7 Drawing Sheets



2026230609

United States Patent [19]

Litzinger

[11] Patent Number: 4,924,886

[45] Date of Patent: May 15, 1990

[54] SMOKING ARTICLE

[75] Inventor: Elmer F. Litzinger, Louisville, Ky.

[73] Assignee: Brown & Williamson Tobacco Corporation, Louisville, Ky.

[21] Appl. No.: 273,775

[22] Filed: Nov. 21, 1988

[51] Int. Cl.³ A24D 3/04

[52] U.S. Cl. 131/194; 131/361;
131/363; 131/364

[58] Field of Search 131/361, 363, 364, 359,
131/369, 198.1, 198.2, 194, 196

[56] References Cited

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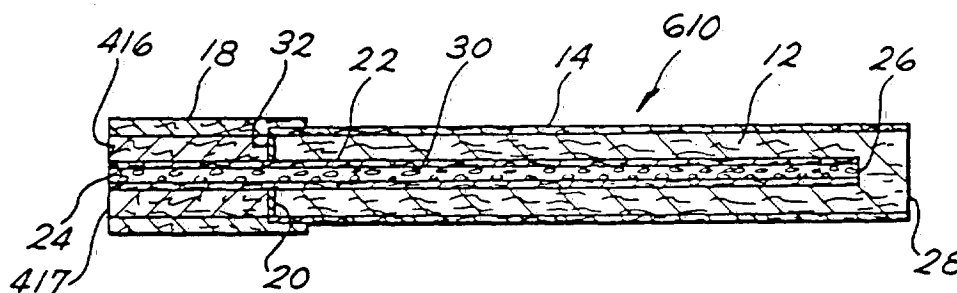
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Charles G. Lamb

[57] ABSTRACT

A smoking device includes a tobacco column having a wrapper and either a mouthpiece or filter rod located coaxially at one end of the tobacco column. A rigid tube is concentrically located in the tobacco column. A substrate of porous material is located within the tube. A flavor releasing material and an aerosol generating material are also disposed within the tube. A smoke impermeable seal is located at the interface of the tobacco column and the mouthpiece/filter.

13 Claims, 2 Drawing Sheets



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LAW DEPT.—PATENT SECTION

MAY 21 1990

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2026230610

[54] SMOKING ARTICLE WITH EMBEDDED SUBSTRATE

[75] Inventor: Michael D. Shannon, Winston-Salem, N.C.

[73] Assignee: R. J. Reynolds Tobacco Company, Winston-Salem, N.C.

[21] Appl. No.: 723,382

[22] Filed: Apr. 15, 1985

[51] Int. Cl.³ A24D 1/18; A24D 1/00; A24D 1/02

[52] U.S. Cl. 131/359; 131/273; 131/335; 131/196; 131/360

[58] Field of Search 131/360, 364, 194, 273, 131/356, 337, 335, 329, 362, 364

[56] References Cited

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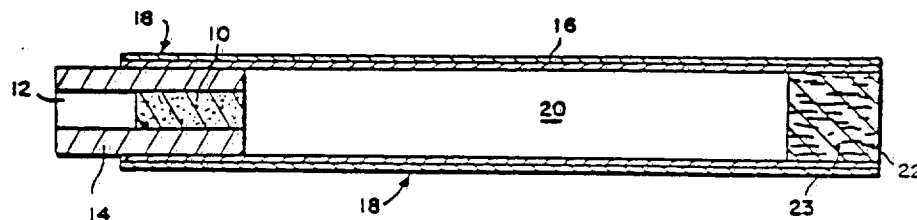
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Grover M. Myers; David G. Conlin

[57] ABSTRACT

The smoking article of the present invention has a short, combustible, preferably carbonaceous, fuel element, generally less than about 30 mm long, which is substantially free of volatile organic material. A physically separate aerosol generating means, preferably comprising a substrate bearing an aerosol forming substance, is located within a cavity in the fuel element, i.e., the aerosol generating means is at least partially embedded in the fuel element. This article may be provided with an external insulating member to reduce radial heat loss and/or with a heat conducting member to increase conductive heat transfer from the fuel element to the aerosol generating means.

28 Claims, 1 Drawing Sheet



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 LAW DEPT.-PATENT SECTION

JUN - 4 1990

[54] DEVICE FOR SELF-ADMINISTRATION OF
PHYSIOLOGICALLY ACTIVE
SUBSTANCES, WITH PREVENTION OF
OVERDOSING

[75] Inventors: Sven-Erik Nilsson, Döbeliusvägen
39, S-253 67 Helsingborg; Ove B.
Fernö, Helsingborg; Jan E. Lilja,
Kristianstad, all of Sweden

[73] Assignee: Sven-Erik Nilsson

[21] Appl. No.: 250,691

[22] PCT Filed: Mar. 20, 1987

[86] PCT No.: PCT/SE87/00146

§ 371 Date: Nov. 18, 1988

§ 102(e) Date: Nov. 18, 1988

[87] PCT Pub. No.: WO87/05813

PCT Pub. Date: Oct. 8, 1987

[30] Foreign Application Priority Data

Mar. 24, 1986 [SE] Sweden 8601351

[51] Int. Cl.⁵ A61M 11/00; A61M 16/00

[52] U.S. Cl. 128/200.23; 128/202.22;
128/203.13

[58] Field of Search 128/200.14, 200.23,
128/204.19, 204.21, 203.12, 203.13, 203.14,
203.23, 203.24, 200.11, 200.12, 200.13, 200.21,
200.22, 200.24, 202.21, 203.15, 204.11

[56] References Cited

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Primary Examiner—Edgar S. Burr

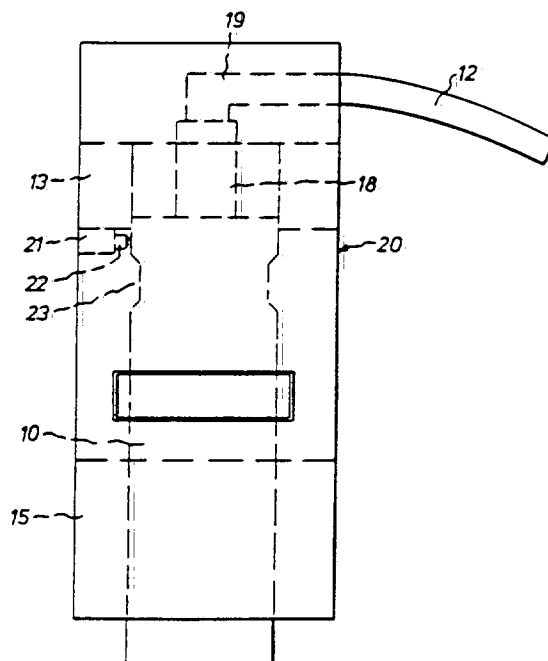
Assistant Examiner—Kimberly L. Asher

Attorney, Agent, or Firm—Burgess, Ryan and Wayne

[57] ABSTRACT

A device for self-administration of physiologically active substances without the occurrence of overdosing, includes a container accommodating at least one substance and propellant means for propelling the substances out of the container, nozzle means connected to the container for discharging a substance, a valve connected between the nozzle and the container such that a predetermined amount of the substance is propelled from the container each time the valve has been opened, and manually activated electronic control means for opening the valve in response to manual activation of the electronic control means and for preventing opening of the valve greater than a predetermined number of times within a predetermined time period.

4 Claims, 3 Drawing Sheets



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LAW DEPT. - PATENT SECTION

AUG - 2 1990

NOTED none filed
~ (C. S. S. via search)

2026230612

United States Patent [19]

Jameson et al.

[11] Patent Number: 4,937,431

[45] Date of Patent: Jun. 26, 1990

[54] APPARATUS FOR DISTRIBUTING A HEATED SCENT

[76] Inventors: Richard N. Jameson, R.R. 2, Box 80;
Dana R. Cook, 1112 S. Elm, both of
Pittsburg, Kans. 66762

[21] Appl. No.: 263,437

[22] Filed: Oct. 27, 1988

[51] Int. Cl.⁵ F22B 1/28

[52] U.S. Cl. 219/274; 219/272;
219/275; 239/59; 43/1

[58] Field of Search 219/271-276;
43/129, 1; 239/58, 59, 51.5

[56] References Cited

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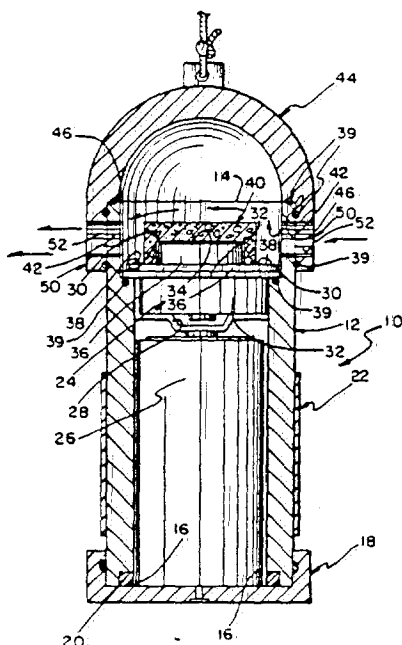
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Primary Examiner—Teresa J. Walberg
Attorney, Agent, or Firm—John W. Carpenter

[57] ABSTRACT

An apparatus for producing heat to enhance an animal lure scent containing a hollow body, a base removably disposed to one end of the hollow body, and a body cap rotatably secured to another end of the hollow body. An electronic circuitry is disposed in the hollow body and includes a heat pot for supplying an odorless heat having a temperature of the body temperature of an animal to be lured. A scent pad is positioned against and over the heat pot to hold a scent of the animal to be lured and to insulate the heat pot during operation.

10 Claims, 3 Drawing Sheets



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LAW DEPT-PATENT SECTION

AUG - 2 1990

2026230613

United States Patent [19]

Banerjee et al.

[11] Patent Number: 4,938,236

[45] Date of Patent: Jul. 3, 1990

[54] TOBACCO SMOKING ARTICLE

[75] Inventors: Chandra K. Banerjee, Pfafftown;
Henry T. Ridings, Lewisville, both of
N.C.

[73] Assignee: R. J. Reynolds Tobacco Company,
Winston-Salem, N.C.

[21] Appl. No.: 408,814

[22] Filed: Sep. 18, 1989

[51] Int. Cl.³ A24D 1/00; A24D 1/18

[52] U.S. Cl. 131/194; 131/271;
131/273; 131/360

[58] Field of Search 131/194, 270, 271, 273,
131/360, 359

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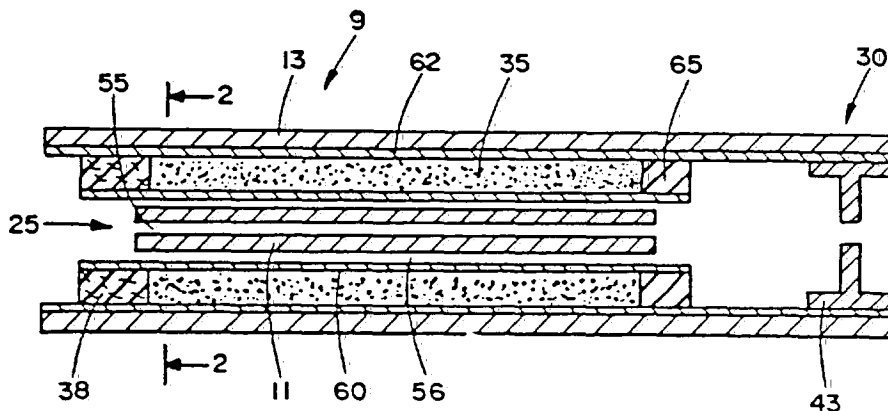
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Primary Examiner—V. Millin

[57] ABSTRACT

A cigarette provides tobacco flavor by heating tobacco, but not burning tobacco or any other material. A heat source which includes granular magnesium, granular iron, and finely divided cellulose generates heat upon contact thereof with an aqueous solution of potassium chloride. The heat source is in a heat exchange relationship with the tobacco. Heat generated by the heat source heats tobacco in a controlled manner. Flavors volatilize from the tobacco and are drawn from the cigarette and into the mouth of the smoker. Typical heat sources heat the tobacco to a temperature within about 70° C. to about 180° C. for 4 to 8 minutes.

47 Claims, 2 Drawing Sheets



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LAW DEPT.—PATENT SECTION

JUL 10 1990

NOTED
S. Lilly
B. Dean
W. Sanders
B. Losee

United States Patent [19]

Ridings et al.

[11] Patent Number: 4,941,483

[45] Date of Patent: Jul. 17, 1990

[54] AEROSOL DELIVERY ARTICLE

[75] Inventors: Henry T. Ridings, Lewisville;
Chandra K. Banerjee, Pfafftown,
both of N.C.

[73] Assignee: R. J. Reynolds Tobacco Company,
Winston-Salem, N.C.

[21] Appl. No.: 410,191

[22] Filed: Sep. 18, 1989

[51] Int. Cl.⁵ A24D 1/00; A24D 1/18

[52] U.S. Cl. 131/194; 131/271;
131/273; 131/360; 128/200.14

[58] Field of Search 131/194, 270, 271, 273,
131/360, 359; 128/200.14

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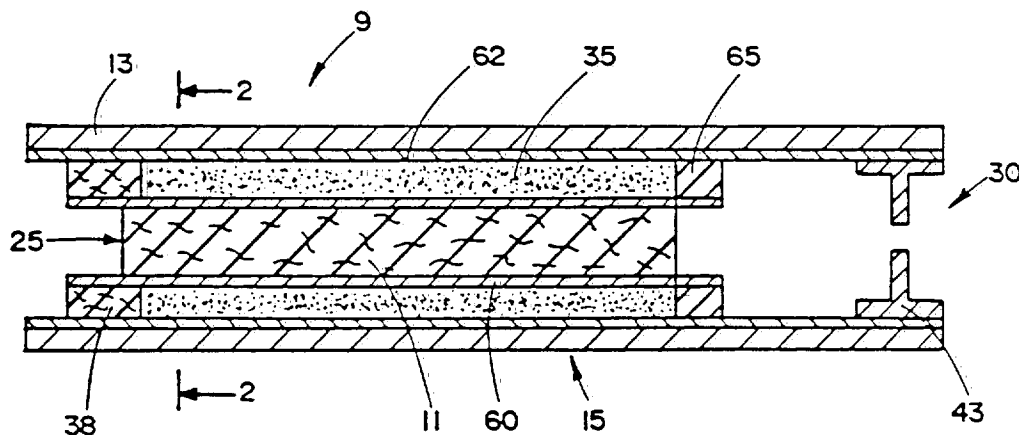
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86/02528 5/1986 PCT Int'l Appl. .

Primary Examiner—V. Millin

[57] ABSTRACT

An aerosol delivery article provides flavor or a dose of a drug by heating a flavor or a drug, but not burning any material. A heat source which includes granular magnesium, granular iron, and finely divided cellulose generates heat upon contact thereof with an aqueous solution of potassium chloride. The heat source is in a heat exchange relationship with the flavor or drug. Heat generated by the heat source heats the flavor or drug in a controlled manner. The flavor or drug volatilizes and is drawn into the mouth of the user of the article. Typical heat sources heat the flavor or drug to a temperature within about 70° C. to about 180° C. for 4 to 8 minutes.

23 Claims, 2 Drawing Sheets



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JUL 23 1990

Kelly
Sanders
Houghton
Charles

2026230615

4,942,883

DRUG DELIVERY DEVICE

Martin H. Newman, 77 Norwood St., Sharon, Mass. 02067

Filed Sep. 29, 1987; Ser. No. 102,540

Int. Cl.³ A61N 1/30

U.S. Cl. 128—798

5 Claims

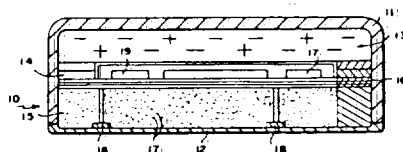
1. A self-contained transdermal medication delivery system for delivering a pre-specified medication to a body location comprising:

- a housing containing at least:
 - a source of electrical current pulses;
 - microprocessor control means for automatically providing said current pulses in accordance with a fixed, pre-

determined program established in said microprocessor control means prior to manufacture of said system for controlling the level of said current pulses and the time period over which said pulses are to be provided;

means for retaining said pre-specified medication, being electrically charged, for placement at a body location for forming with said body location an electrical current path responsive to said current pulses to cause said medication to be delivered transdermally from said medication retaining means to said body location;

said microprocessor means thereby permitting a predetermined dosage of said pre-specified medication to be delivered automatically at a predetermined rate to said body location in accordance with said fixed, predetermined



program wherein said medication retaining means is formed separately from said housing and includes a hydrophilic membrane having molecules of a medication distributed therein, and further including

electrode means for coupling to said separately formed medication retaining means;

cable means for interconnecting said electrode means and said source of current pulses,

one or more separately formed cartridges containing medication in liquid form, each cartridge being inserted into said housing means for attachment to said cable means, said cable means including a channel for transporting said liquid medication to the membrane of said medication retaining means for distribution of said medication therein.

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4,942,037

TRANSDERMAL DELIVERY SYSTEMS

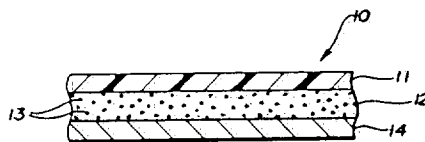
Joseph V. Bondi, Collegeville, and Alice E. Loper, Lederach,
both of Pa., assignors to Merck & Co., Inc., Rahway, N.J.

Filed Jun. 2, 1988, Ser. No. 202,088

Int. Cl.³ A61F 13/02

U.S. Cl. 424—448

2 Claims



1. A therapeutic system in the form of a transdermal patch for administering (+)-PHNO comprising (a) a backing member impermeable to (+)-PHNO, (b) a reservoir of solid silicone polymer matrix containing (+)-PHNO and glycerol wherein the said solid reservoir matrix constitutes a solvent for the drug wherein in said matrix the drug is present in excess of its solubility and there is additionally present glycerol as cosolvent in an amount of from about 0.5 to no greater than 40 percent by weight, (c) a rate controlling membrane of silicone polymer, and (d) optionally a face adhesive and wherein said patch provides said (+)-PHNO at a therapeutic rate of from about 2 micrograms to about 20 micrograms per square centimeter per hour.

2026230617

United States Patent [19]

Baker et al.

[11] Patent Number: 4,943,435

[45] Date of Patent: Jul. 24, 1990

[54] PROLONGED ACTIVITY NICOTINE PATCH

[75] Inventors: Richard W. Baker, Palo Alto; Frank Kochinke, Fremont; Carl Huang, Palo Alto, all of Calif.

[73] Assignee: Pharmetrix Corporation, Menlo Park, Calif.

[21] Appl. No.: 264,397

[22] Filed: Oct. 28, 1988

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 105,549, Oct. 5, 1987, Pat. No. 4,839,174.

[51] Int. Cl.³ A61L 15/00

[52] U.S. Cl. 424/448; 424/449; 424/486; 128/156; 128/632; 131/335

[58] Field of Search 424/448, 449, 486; 128/156, 632; 131/335

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Primary Examiner—Henry F. Epstein

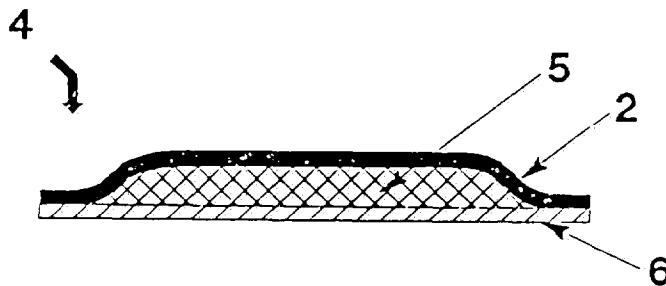
Assistant Examiner—P. S. Ryan

Attorney, Agent, or Firm—A. J. Castro; J. Farrant

[57] ABSTRACT

A transdermal patch for delivering nicotine for prolonged periods of 12-24 hours. The patch includes a rate-controlling membrane or monolith to keep the nicotine flux within useful and safe limits. The patch is typically replaced once a day, and can be used for smoking cessation therapy or in other situations where systemic nicotine delivery is indicated.

22 Claims, 8 Drawing Sheets



PHILIP M. ROSE, JR.
PHILIP M. ROSE, JR. & ASSOCIATES
LAW FIRM

AUG 20 1990

NOTED _____

2026230618

[54] SMOKING OF REGENERATED TOBACCO SMOKE

[76] Inventor: Jed E. Rose, 1371 Appleton Way,
Venice, Calif. 90291

[21] Appl. No.: 322,689

[22] Filed: Mar. 13, 1989

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 840,072, Mar. 17,
1986, Pat. No. 4,846,199.[51] Int. Cl.³ A24F 47/00

[52] U.S. Cl. 131/270; 131/273

[58] Field of Search 131/173, 270, 194, 359,
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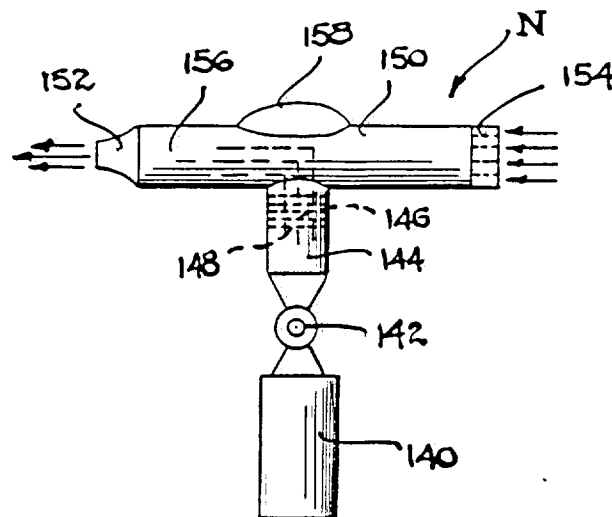
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Robert J. Schaap

[57] ABSTRACT

A method and apparatus for regenerating tobacco smoke such that certain of the constituents may be smoked upon aerosolization thereof. The method and apparatus relies upon generating smoke from tobacco leaves or other grown plant substances and passing the smoke through a solvent, such as water. Certain of the fluidized components and certain of the gaseous components in the stream of tobacco smoke may then be captured in and preferably dissolved in the solvent. The dissolved or suspended smoke components may then be formed into an aerosol for inhalation by a user. By dissolving selected components in the solvent, many of the harmful gaseous and fluidized constituents of a smoke stream are eliminated. Moreover, an aerosol is generated such that the particle sizes of the aerosol are sufficiently large that they are predominantly deposited in the upper respiratory tract. In this way, the smoker receives the sensations to which the smoker is normally accustomed from tobacco smoke without many of the harmful side effects of tobacco smoke.

39 Claims, 2 Drawing Sheets

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AUG 9 1990

NOTED _____

2026230619

[54] AEROSOL DEVICE SIMULATING A
SMOKING ARTICLE[75] Inventor: Nazli Egilmex, Southampton,
England[73] Assignee: British-American Tobacco Co., Ltd.,
London, England

[21] Appl. No.: 62,815

[22] Filed: Jun. 16, 1987

[30] Foreign Application Priority Data

Jun. 18, 1986 [GB] United Kingdom 8614805

[51] Int. Cl.⁵ A24F 47/00; A61M 11/00;
A61M 15/06[52] U.S. Cl. 131/273; 128/200.21;
128/202.21[58] Field of Search 131/273; 128/200.21,
128/202.21

[56] References Cited

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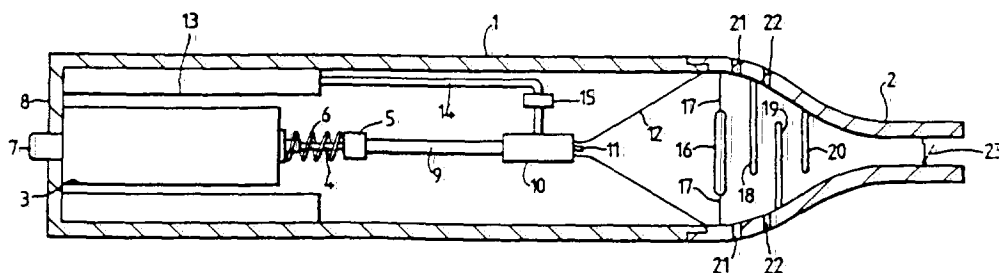
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Charles G. Lamb

[57] ABSTRACT

A nicotine dispensing aerosol device has nicotine and propellant storage containers connected to atomization nozzle from which a nicotine-aerosol spray can flow. A conical aerosol confining chamber extends from the nozzle, the cross-section of the chamber enlarging away from the nozzle. Large aerosol particles are removed by impaction on the upstream face of an impaction member, which member is located in the wider, outlet region of the aerosol confining chamber. A series of baffles are provided downstream of the impaction member, which baffles serve to produce a long, sinuous path for aerosol flow. The duration of the passage of the aerosol from the nozzle to the user is thereby increased, allowing more evaporation of the particulate phase of the aerosol. The device is, therefore, operable to dispense nicotine in an aerosol of a constitution which approximates that of tobacco smoke.

15 Claims, 1 Drawing Sheet

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LAW DEPT-PATENT SECTION

AUG 9 1990

NOTED (British publication
circulated last year)

2026230620

United States Patent [19]
Gori

[11] Patent Number: 4,945,931
[45] Date of Patent: Aug. 7, 1990

[54] SIMULATED SMOKING DEVICE

[75] Inventor: Gio B. Gori, Bethesda, Md.
[73] Assignee: Brown & Williamson Tobacco Corporation, Louisville, Ky.

[21] Appl. No.: 379,831

[22] Filed: Jul. 14, 1989

[51] Int. Cl.³ A24B 15/00

[52] U.S. CL. 131/335; 131/194;
131/271; 131/273

[58] Field of Search 131/331, 271, 273, 194,
131/335, 333

[56] References Cited

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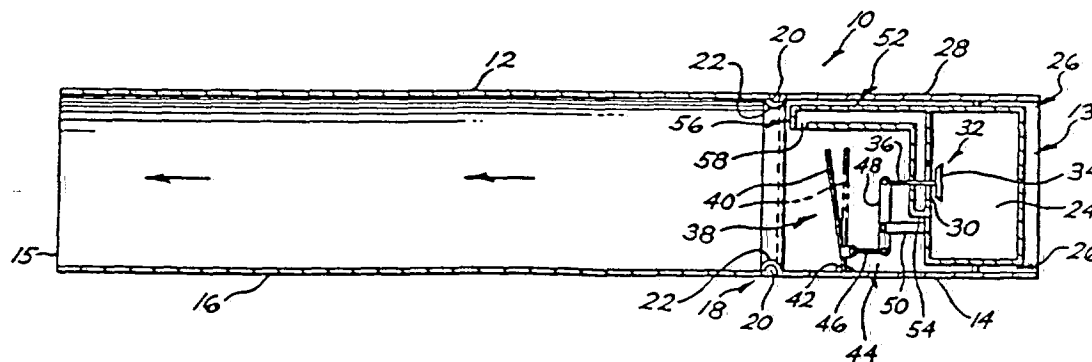
Primary Examiner—V. Millin
Assistant Examiner—J. L. Doyle

Attorney, Agent, or Firm—Charles G. Lamb

[57] ABSTRACT

A simulated smoking device includes a hollow tube with a capsule of pressurized aerosol generating material located inside the tube. An air flow passage is defined between the capsule and tube wall. The capsule includes an aerosol outlet port having a valve for selectively opening and closing the outlet port. An air operated valve activator is located inside the tube downstream of the air flow passage and is operatively connected to the valve. An aerosol passage communicates with the aerosol outlet port of the capsule and has a discharge end downstream of the air passage. Air is drawn into the tube, passes through the air passages, and impacts the air operated valve activator causing the valve to move opening the aerosol outlet port of the capsule releasing aerosol into the air flow downstream of the air operated valve activator.

10 Claims, 2 Drawing Sheets



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2026230621

[54] SMOKING ARTICLES UTILIZING ELECTRICAL ENERGY

[75] Inventors: Johnny L. Brooks; Donald L. Roberts, both of Winston-Salem; Jerry S. Simmons, Rural Hall, all of N.C.

[73] Assignee: R. J. Reynolds Tobacco Company, Winston-Salem, N.C.

[21] Appl. No.: 242,086

[22] Filed: Sep. 8, 1988

[51] Int. Cl.⁵ A24D 1/00; A24F 1/00; A24F 47/00; A61M 16/00

[52] U.S. Cl. 131/329; 131/273; 131/194; 128/202.21; 128/203.26; 128/203.27; 128/204.21

[58] Field of Search 131/329, 194, 273; 128/202.21, 202.27, 203.12, 203.13, 203.15, 204.21, 203.17, 203.26, 203.27, 204.13, 204.23

[56] References Cited

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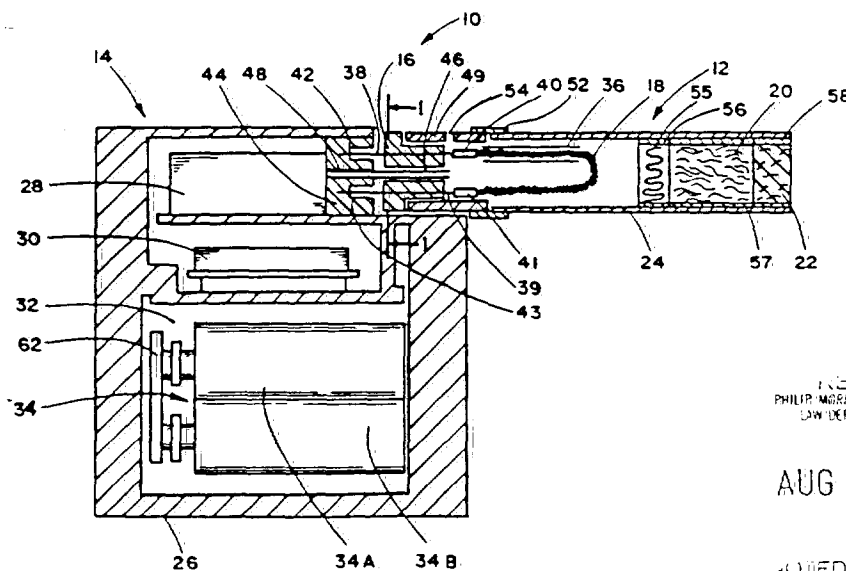
Tobacco and Tobacco Smoke, Wynder et al., pp. 482 and 522 (1967).

Primary Examiner—V. Millin

[57] ABSTRACT

Smoking articles employ an electrical resistance heating element and an electrical power source to provide a tobacco-flavored smoke or aerosol and other sensations of smoking. The smoking articles advantageously comprise a disposable portion and a reusable controller. The disposable portion, which may be a cigarette, normally includes (i) an air permeable resistance heating element having a surface area greater than 1 m²/g, which usually carries an aerosol forming material, and (ii) a charge or roll of tobacco. The reusable controller normally includes a puff-actuated current actuation means, a time-based current regulating means to control the temperature of the heating element, and a battery power supply.

202 Claims, 8 Drawing Sheets



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AUG 16 1990

FILED

United States Patent [19]

Brooks et al.

[11] Patent Number: 4,947,875

[45] Date of Patent: Aug. 14, 1990

[54] FLAVOR DELIVERY ARTICLES UTILIZING ELECTRICAL ENERGY

[75] Inventors: Johnny L. Brooks; Donald L. Roberts, both of Winston-Salem; Jerry S. Simmons, Rural Hall, all of N.C.

[73] Assignee: R. J. Reynolds Tobacco Company, Winston-Salem, N.C.

[21] Appl. No.: 242,083

[22] Filed: Sep. 8, 1988

[51] Int. Cl.³ A24F 1/00; A24F 47/00

[52] U.S. Cl. 131/330; 131/273; 131/194; 131/195; 128/202.21; 128/203.27; 128/204.23; 128/204.24

[58] Field of Search 131/330; 273, 194, 195; 128/202.21; 203.27, 204.23, 204.29

[56] References Cited

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4,771,796 9/1988 Myer .

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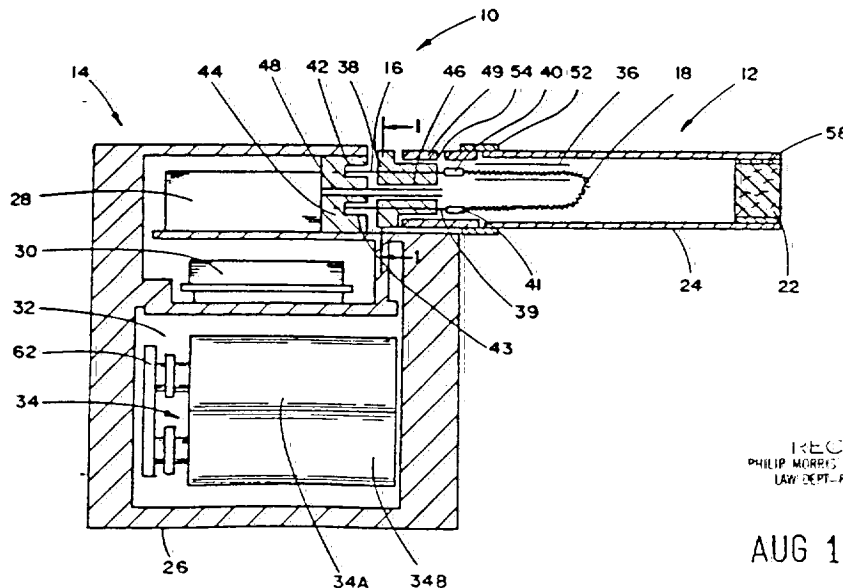
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3300992 7/1984 Fed. Rep. of Germany .
2128256 10/1972 France .
48-8231 3/1973 Japan .
WO86/02528 5/1986 PCT Int'l Appl. .
197946 4/1924 United Kingdom .

Primary Examiner—V. Millin

[57] ABSTRACT

Flavor delivery articles employ an electrical resistance heating element and an electrical power source to provide a flavored aerosol. The articles advantageously comprise a disposable portion and a reusable controller. The disposable portion normally includes a flavor substance and an air permeable resistance heating element having a surface area greater than $1 \text{ m}^2/\text{g}$, which usually carries an aerosol forming substance. The reusable controller normally includes a puff-actuated current actuation means, a time-based current regulating means to control the temperature of the heating element, and a battery power supply.

136 Claims, 8 Drawing Sheets



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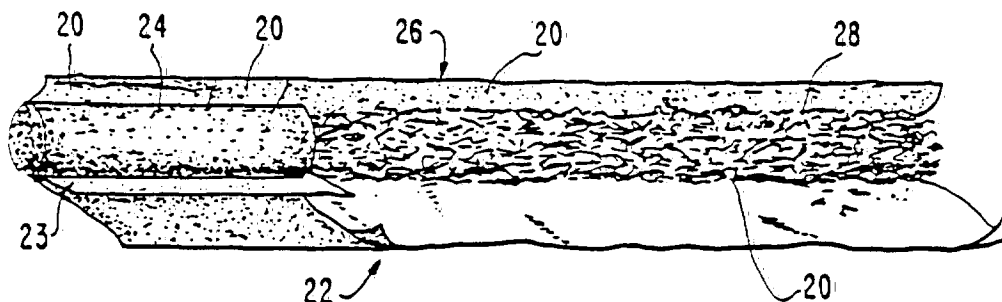
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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|---|--|---|---|
| (51) International Patent Classification ⁺ : A24B 15/30, A24C 5/01 A24D 1/02 | | A1 | (11) International Publication Number: WO 89/ 06911 (43) International Publication Date: 10 August 1989 (10.08.89) |
| (21) International Application Number: PCT/US88/00204 (22) International Filing Date: 28 January 1988 (28.01.88) (71) Applicant: C.A. BLOCKERS, INC. [US/US]; 2340 Meidinger Tower, Louisville Galleria, Louisville, KY 40202 (US). (72) Inventors: WADDELL, William, J.; 6604 Gunpowder Lane, Prospect, KY 40059 (US). MARLOWE, Carolyn; 6604 Gunpowder Lane, Propect, KY 40059 (US). KEENEY, L., Douglas; 54 Tepee Road, Louisville, KY 40207 (US). (74) Agents: BOLAND, Thomas, R. et al.; Vorys, Sater, Seymour & Pease, Suite 1111, 1828 L Street, N.W., Washington, DC 20036-5104 (US). | | (81) Designated States: AT, AT (European patent), AU, BB, BE (European patent), BG, BJ (OAPI patent), BR, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CM (OAPI patent), DE, DE (European patent), DK, FI, FR (European patent), GA (OAPI patent), GB, GB (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC, MG, ML (OAPI patent), MR (OAPI patent), MW, NL, NL (European patent), NO, RO, SD, SE, SE (European patent), SN (OAPI patent), SU, TD (OAPI patent), TG (OAPI patent). Published With international search report. RECEIVED PHILIP MORRIS MANAGEMENT CORP. LAW DEPT.-PATENT SECTION SEP 25 1989 JES. Clipping NOTED J. Challen F. Friedman Ted Sander | |

(54) Title: PROCESS FOR MANUFACTURING CIGARETTES EMPLOYING PRESELECTED ALCOHOLS



(57) Abstract

A process for manufacturing cigarettes (22) which reduces health risks to smokers. According to this process redried cut rag tobacco (28) is sprayed with one or more preselected alcohols which are capable, when the vapors thereof are inhaled by the smoker, of inhibiting or blocking the selective localization of at least one nitrosamine and/or a metabolite thereof in the smoker's tissues such as those of the epithelial lining of his lungs. An example of such an alcohol is cyclohexanol in an ethyl alcohol solution. After the solution has been sprayed on the tobacco, the tobacco is machined in a conventional manner into the final cigarette (22), either filtered (24) or unfiltered. Upon smoking, the blocking alcohol is then heat released into the smoke stream, resulting in the desired blocking effect in the smoker, without noticeably altering the



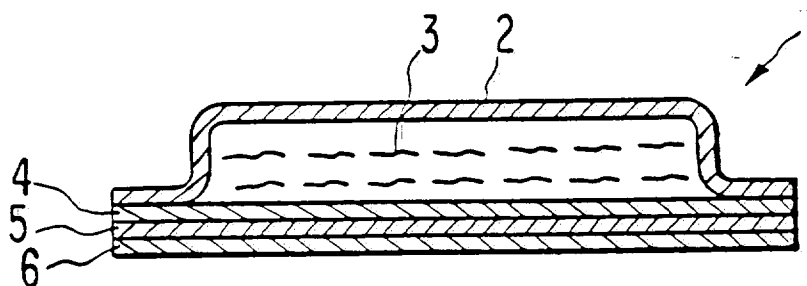
PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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|---|--|--|--|
| (51) International Patent Classification ⁴ : A61L 15/03, A61K 9/70 | | A1 | (11) International Publication Number: WO 89/12470 (43) International Publication Date: 28 December 1989 (28.12.89) |
| (21) International Application Number: PCT/US89/02561 (22) International Filing Date: 13 June 1989 (13.06.89) (30) Priority data: 206,546 14 June 1988 (14.06.88) US 284,283 14 December 1988 (14.12.88) US (60) Parent Applications or Grants (63) Related by Continuation US 206,546 (CIP) Filed on 14 June 1988 (14.06.88) US 284,283 (CIP) Filed on 14 December 1988 (14.12.88) (71) Applicant (for all designated States except US): ALZA CORPORATION [US/US]; 950 Page Mill Road, Palo Alto, CA 94303-0802 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): OSBORNE, James, L. [US/US]; 2365 Thompson Court, Mountain View, CA 94043 (US). NELSON, Melinda [US/US]; 1127 Hollenbeck Road, Sunnyvale, CA 94087 (US). ENSCORE, David, James [US/US]; 18291 Montpere Way, Saratoga, CA 95070 (US). YUM, Su, II [US/US]; 1021 Runnymede Court, | | Los Altos, CA 94022 (US). GALE, Robert, M. [US/US]; 1276 Russell Avenue, Los Altos, CA 94022 (US). CAMPBELL, Patricia, S. [US/US]; 140 Middlefield Road, Palo Alto, CA 94301 (US). (74) Agents: STONE, Steven, F. et al.; ALZA Corporation, 950 Page Mill Road, Palo Alto, CA 94303-0802 (US). (81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), DK, FI, FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), NO, SE, SE (European patent), US, US. Published With international search report. With amended claims and statement. RECEIVED PHILIP MORRIS MANAGEMENT CORP. LAW DEPT.-PATENT SECTION JAN 29 1990 NOTED _____ | |

(54) Title: SUBSATURATED TRANSDERMAL DELIVERY DEVICE



(57) Abstract

Subsaturated, rate controlled delivery devices (1) for delivering an agent (5). The initial equilibrated concentration of the agent in the agent reservoir (3) and the adhesive (5) is below saturation. The initial loading of the agent in reservoir (3) is sufficient to prevent the activity of the agent in the reservoir (3) from decreasing by more than about 75 % and preferably no more than about 25 % during the predetermined period of administration. The thicknesses of the adhesive (5), rate controlling membrane (4) and reservoir (3) layers are selected so that at least 50 % and, preferably at least 75 % of the initial equilibrated agent loading is in the reservoir layer (3). The devices (1) are usable to deliver agents which are liquid at body temperatures such as benzotropine, secoverine, nicotine, arecoline, polyethylene glycol monolaurate, glycerol monolaurate, glycerol monooleate and ethanol, for example.

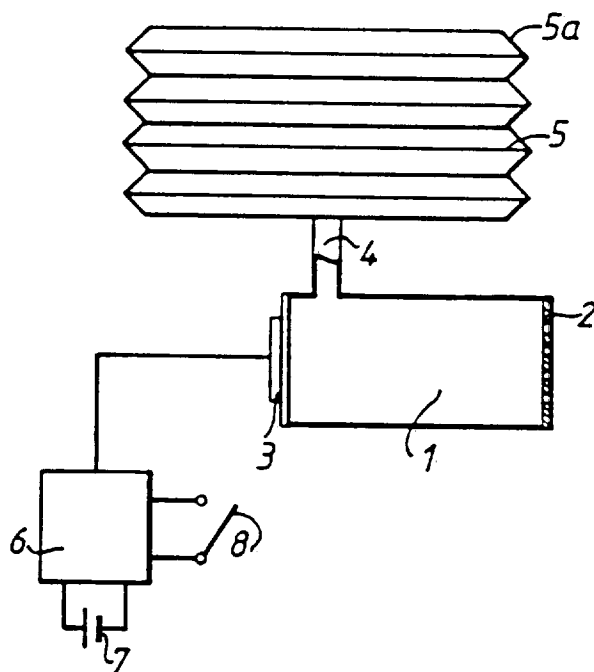
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PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| (51) International Patent Classification ⁵ : B05B 17/06 | A1 | (11) International Publication Number: WO 90/01997 (43) International Publication Date: 8 March 1990 (08.03.90) |
| (21) International Application Number: PCT/GB89/00944 (22) International Filing Date: 15 August 1989 (15.08.89) (30) Priority data: 8819473.3 16 August 1988 (16.08.88) GB (71) Applicant (for all designated States except US): P.A. CONSULTING SERVICES LIMITED [GB/GB]; Cambridge Laboratory, Melbourn, Royston, Hertfordshire SG8 6DP (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): JENSEN, Borge, Riis [DK/BE]; Dieweg 54/7, B-1180 Brussels (BE). (74) Agent: DAWSON, Elizabeth, A.; A.A. Thornton & Co., Northumberland House, 303-306 High Holborn, London WC1V 7LE (GB). | | (81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US. Published <i>With international search report.</i> <div style="text-align: center;"> RECEIVED PHILIP MORRIS MANAGEMENT CORP. LAW DEPT-PATENT SECTION APR 23 1990 NOTED _____ </div> |

(54) Title: ELECTRONIC AEROSOL GENERATOR**(57) Abstract**

An aerosol generator comprises a reservoir (5) for liquid to be dispensed and an exit cavity (1) having a plurality of exit orifices formed in an orifice plate (2). The cavity (1) is coupled to a piezoelectric transducer assembly (6) arranged to induce pressure variations in the exit cavity. A control circuit (8) is connected to the transducer assembly (6) and a power source (4) and ground (7).

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(21) Int. Application Number: PCT/FR89/00501

(22) Int. Filing Date: 28 September 1989 (28.09.89)

(30) Priority data:
88/12933 29 September 1988 FR
(29.09.88)

(71)(72) Applicant and Inventor: JOST, Didier,
Georges [FR/FR]; 32, rue du Coëtlosquet, F-
57000 Metz (FR).

(72) Inventor; and
(75) Inventor/Applicant (for US only): JOST, Bernard
[FR/FR]; 13, rue Rabelais, F-57000 Metz
(FR).

(81) Designated States: AT (European patent), AU,
BE (European patent), BR, CH (European pa-
tent), DE (European patent), DK, FI, FR (Eu-
ropean patent), GB (European patent), IT
(European patent), JP, LU (European patent),
NL (European patent), NO, SE (European pa-
tent), SU, US.

Published
With international search report.

(51) International Patent Classification⁵:

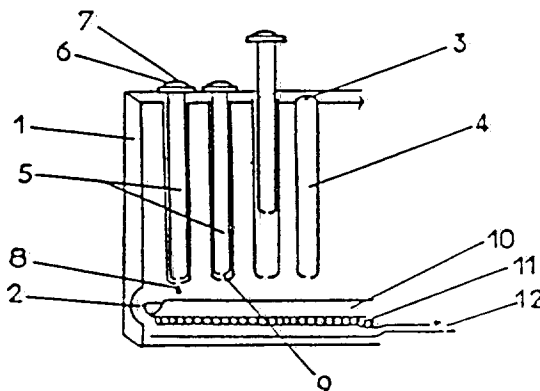
A61L 9/03

A1

(11) Int. Publication Number: WO 90/03192

(43) Int. Publication Date: 5 April 1990 (05.04.90)

(54) Title: DEVICE FOR ALLOWING THE EMANATION OF AROMAS OR ESSENTIAL OILS



(57) Abstract

The invention relates to a device allowing the simultaneous emanation of different aromas or essential oils with a view to instantaneously benefiting from the deodorizing, perfuming and therapeutic qualities of said aromas or essential oils. The device is comprised of a support (1) which receives a plurality of small removable reservoirs (5) wherein are conditioned a variety of aromas. By pressing with the finger on the upper extremity (7) of the reservoir, the latter liberates as desired one or a plurality of essence droplets (8) in a horizontal gutter (10) made of thin metal and provided at the base of the casing, which gutter is heated to the temperature required for the evaporation of said essence (8) by means of a resistance (11) which is integral with the gutter (10), the resistance being supplied by an energy source (12) which is external or integral with the casing. The casing is formed by two lateral hollow parts (2) in order to free emanations of aromas. The device according to the invention is intended for diffusion of essential oils in all closed or closable living spaces.

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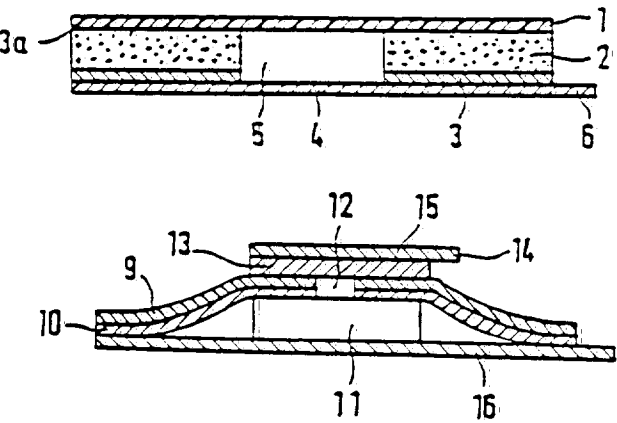
A61K

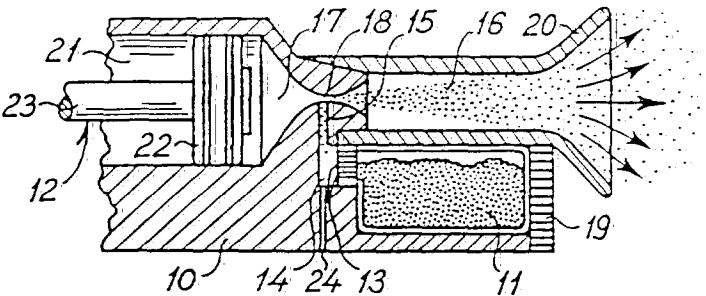
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|---|--|---|
| (21) Int. Application Number: PCT/JP89/01323 | (51) International Patent Classification ⁵ : A61K 9/20 | (11) Int. Publication Number: WO 90/07327 |
| (22) Int. Filing Date: 28 December 1989 (28.12.89) | A1 | (43) Int. Publication Date: 12 July 1990 (12.07.90) |
| (30) Priority data: 63/331821 28 December 1988 JP (28.12.88) | (54) Title: STRESS SCATTERING METHOD IN TABLETING | |
| (71) Applicant (for all designated States except US): TAISHO PHARMACEUTICAL CO., LTD. [JP/JP]; 24-1, Takata 3-chome, Toshima-ku, Tokyo 171 (JP). | (57) Abstract: | |
| (72) Inventors; and: | This invention relates to a tableting composition containing minute gelatine balls and/or foams as stress scattering agents so as to minimize the disintegration of microcapsules on the transformation of medicine during tableting; and a stress scattering method in tableting. The use of the tableting composition according to the present invention enables tablets to be made without causing microencapsulated medicine powder, enzymes, germs or substances of a low melting point to be transformed or disintegrated. | |
| (75) Inventors/Applicants (for US only): YUASA, Hiroshi [JP/JP]; Higashigaoka Apartment Room 305, 12-1, Hatagaya 2-chome, Shibuya-ku, Tokyo 151 (JP). KANAYA, Yoshio [JP/JP]; 15-3, Nogata 5-chome, Nakano-ku; Tokyo 165 (JP). OMATA, Kazuki [JP/JP]; 22-6, Honchou 6-chome, Meguro-ku, Tokyo 152 (JP). | | |
| (74) Agent: KITAGAWA, Tomizou; Taisho Pharmaceutical Co., Ltd., 24-1, Takata 3-chome, Toshima-ku, Tokyo 171 (JP). | | |
| (81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European patent), US. | Published With international search report. | |
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|---|---|---|
| (21) Int. Application Number: PCT/US89/05798 | (51) International Patent Classification ⁵ : A61K 9/70, A61L 15/00 | (11) Int. Publication Number: WO 90/07328 |
| (22) Int. Filing Date: 22 December 1989 (22.12.89) | A1 | (43) Int. Publication Date: 12 July 1990 (12.07.90) |
| (30) Priority data: P 38 44 247.7 29 December 1988 DE (29.12.88) | (54) Title: APPLICATION SYSTEM FOR DRUG CONTAINING MICROEMULSIONS | |
| (71) Applicant (for all designated States except US): RIKER LABORATORIES, INC. [US/US]; P.O. Box 33427, Saint Paul, MN 55133 (US). | | |
| (72) Inventors; and: (75) Inventors/Applicants (for US only): KRECKEL, Karl, W. [DE/DE]; Wilbecke 12-14, P.O. Box 1340, D-4280 Borken I (DE). ZERBE, Horst-Georg [DE/DE]; Wilhelm-Busch-Strasse 4, D-4281 Velen (DE). | | |
| (74) Agents: SPRAGUE, Robert, W. et al.; Minnesota Mining and Manufacturing Company, P.O. Box 33427, St. Paul, MN 55133-3427 (US). | (57) Abstract | |
| (81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US. | The invention deals with devices, in particular with bandage strips, for a transdermal delivery of drugs to patients, whereby the drug formulations include highly viscous preparations, topical solutions of a low viscosity and micro-emulsions of a low viscosity containing the drugs. Depending on the consistency of the medium containing the drug, the drug formulation is stored in a reservoir, consisting, e.g., of a punched out cavity or of an absorbent piece of material, which is encased or supported by a carrier element (a formed material piece or a non-woven fleece tape) adhering to the skin by means of a skin-compatible adhesive, whereby specially formed protective films are applied at the filling and delivery side during the storage of the device to prevent a lateral migration, and whereby during its use, the device can be refilled with dosed amounts by the patient without requiring a removal of the device from the skin surface to be treated (Fig. 2). | |
| Published With international search report. | | |

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|---|---|---|
| (21) Int. Application Number: PCT/JP89/01323 | (51) International Patent Classification ⁵ : A61K 9/20 | (11) Int. Publication Number: WO 90/07327 |
| (22) Int. Filing Date: 28 December 1989 (28.12.89) | A1 | (43) Int. Publication Date: 12 July 1990 (12.07.90) |
| <p>(30) Priority data: 63/331821 28 December 1988 JP (28.12.88)</p> | | |
| <p>(71) Applicant (for all designated States except US): TAISHO PHARMACEUTICAL CO., LTD. [JP/JP]; 24-1, Takata 3-chome, Toshima-ku, Tokyo 171 (JP).</p> | | |
| <p>(72) Inventors; and:</p> | | |
| <p>(75) Inventors/Applicants (for US only): YUASA, Hiroshi [JP/JP]; Higashigaoka Apartment Room 305, 12-1, Hatagaya 2-chome, Shibuya-ku, Tokyo 151 (JP). KANAYA, Yoshio [JP/JP]; 15-3, Nogata 5-chome, Nakano-ku, Tokyo 165 (JP). OMATA, Kazuki [JP/JP]; 22-6, Honchou 6-chome, Meguro-ku, Tokyo 152 (JP).</p> | | |
| <p>(74) Agent: KITAGAWA, Tomizou; Taisho Pharmaceutical Co., Ltd., 24-1, Takata 3-chome, Toshima-ku, Tokyo 171 (JP).</p> | | |
| <p>(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European patent), US.</p> | | |
| <p>Published With international search report.</p> | | |
| <p>(54) Title: STRESS SCATTERING METHOD IN TABLETING</p> <p>(57) Abstract: This invention relates to a tableting composition containing minute gelatine balls and/or foams as stress scattering agents so as to minimize the disintegration of microcapsules on the transformation of medicine during tableting; and a stress scattering method in tableting. The use of the tableting composition according to the present invention enables tablets to be made without causing microencapsulated medicine powder, enzymes, germs or substances of a low melting point to be transformed or disintegrated.</p> | | |

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| (21) Int. Application Number: PCT/US89/05798 | (51) International Patent Classification ⁵ : A61K 9/70, A61L 15/00 | (11) Int. Publication Number: WO 90/07328 |
| (22) Int. Filing Date: 22 December 1989 (22.12.89) | A1 | (43) Int. Publication Date: 12 July 1990 (12.07.90) |
| <p>(30) Priority data: P 38 44 247.7 29 December 1988 DE (29.12.88)</p> | | |
| <p>(71) Applicant (for all designated States except US): RIKER LABORATORIES, INC. [US/US]; P.O. Box 33427, Saint Paul, MN 55133 (US).</p> | | |
| <p>(72) Inventors; and:</p> | | |
| <p>(75) Inventors/Applicants (for US only): KRECKEL, Karl, W. [DE/DE]; Wilbecke 12-14, P.O. Box 1340, D-4280 Borken I (DE). ZERBE, Horst-Georg [DE/DE]; Wilhelm-Busch-Strasse 4, D-4281 Velen (DE).</p> | | |
| <p>(74) Agents: SPRAGUE, Robert, W. et al.; Minnesota Mining and Manufacturing Company, P.O. Box 33427, St. Paul, MN 55133-3427 (US).</p> | | |
| <p>(81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US.</p> | | |
| <p>Published With international search report.</p> | | |
| <p>(54) Title: APPLICATION SYSTEM FOR DRUG CONTAINING MICROEMULSIONS</p>  | | |
| <p>(57) Abstract The invention deals with devices, in particular with bandage strips, for a transdermal delivery of drugs to patients, whereby the drug formulations include highly viscous preparations, topical solutions of a low viscosity and micro-emulsions of a low viscosity containing the drugs. Depending on the consistency of the medium containing the drug, the drug formulation is stored in a reservoir, consisting, e.g., of a punched out cavity or of an absorbent piece of material, which is encased or supported by a carrier element (a formed material piece or a non-woven fleece tape) adhering to the skin by means of a skin-compatible adhesive, whereby specially formed protective films are applied at the filling and delivery side during the storage of the device to prevent a lateral migration, and whereby during its use, the device can be refilled with dosed amounts by the patient without requiring a removal of the device from the skin surface to be treated (Fig. 2).</p> | | |

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| <p>(21) Int. Application Number: PCT/DK90/00005</p> | <p>(51) International Patent Classification⁵: A61M 13/00, 15/00</p> | <p>(11) Int. Publication Number: WO 90/07351</p> |
| <p>(22) Int. Filing Date: 8 January 1990 (08.01.90)</p> | <p>A1</p> | <p>(43) Int. Publication Date: 12 July 1990 (12.07.90)</p> |
| <p>(30) Priority data: 65/89: 6 January 1989 DK (06.01.89) 659/89: 10 February 1989 DK (10.02.89) 4791/89: 28 September 1989 DK (28.09.89)</p> | <p>(54) Title: AN ORAL INHALER</p> | |
| <p>(71)(72) Applicants and Inventors: SCHENK, Hans, Gernot [DK/DK]; Hovborgvej 11, Lindknud, DK-6650 Brørup (DK); PEDERSEN, Søren [DK/DK]; Vangen 17, DK-6000 Kolding (DK).</p> |  | |
| <p>(74) Agent: PLOUGMANN & VINGTOFT; Sankt Annæ Plads 11, DK-1250 Copenhagen K (DK).</p> | <p>(57) Abstract</p> | |
| <p>(81) Designated States: AT (European patent), AU, BE (European patent), CA, CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US.</p> | <p>An oral inhaler for use in inhaling a powdered or particulate medical product comprises a chamber (14) for containing the medical product, a mixing chamber (16), a gas flow passage (17) connected to the mixing chamber, and a pressure gas source or pumping device (40) for briefly providing in the gas flow passage a vigorous gas flow directed towards the mixing chamber. In order to obtain a high velocity of the gas flow, the gas flow passage (17) has nozzle-like restriction (18). The product chamber (14) is communicating with the gas flow passage (17) at the restriction (18) or adjacent thereto so as to draw product from the product chamber into the gas flow by ejector effect, whereby the product is disintegrated in small respirable particles, which are thoroughly mixed with the gas flow. A product reservoir (11) may be provided for containing a product supply sufficient for several inhalation procedures. The medical product may, for example, be transferred from a product reservoir to product chambers or metering chambers (14), which are defined in a rotatable cylinder or drum (38). The pressure gas source may be a pumping device, such as a piston pump. However, the pumping device preferably comprises a pumping chamber having a springy, diaphragm-like wall part (40).</p> | |
| <p>Published With international search report.</p> | | |

2026230630

Canadian Patent

[52] 167-159 [11] 1,238,275
[51] INT. CL.⁴A61K 9/06
[54] Menthol Enhancement of Transdermal
Drug Delivery
[54] Augmentation par le menthol de
l'absorption transdermique de
médicament
[72] Tsuk, Andrew G., U.S.A./E.-U.
[73] American Home Products Corporation,
U.S.A./E.-U.
[21] 470,941 [22] 841221
[30] U.S.A./E.-U. (564,654) 831222
Claims 5 Revendications

2026230631

BREVETS CANADIENS DÉLIVRÉS LE 17 JUILLET 1990

(52) 165-17 (51) 1,271,701
(53) INT. CL. A61L 9/03
(54) **Method and Apparatus of Vaporizing
Active Substances**
(54) **Méthode et dispositif de vaporisation
de substances actives**
(72) Morita, Masahiro; Tashiro, Kiyotomi,
Eguma, Chikashi; Suo, Osamu, Japan/
Japon
(73) Daiken Iko Kabushiki Kaisha, Japan/
Japon; Kabushiki Kaisha Fujiko, Japan/
Japon; Shiraimatsu Shinyaku Kabushiki
Kaisha,
Japan/Japon
(21) 531,024, (22) 870303
(30) Japan/Japon (47866/1986) 860304
Claims 16 Revendications

2026230632

Published Applications
DEMANDES CANADIENNES

[52] 128-64 [11] 2,005,151

[54] INTL.CL.³A61M-15/00; A61M-11/00

[54] Inhalator Device, in Particular a Pocket Inhalator

[54] Inhalateur de poche

[72] VanDer Linden, Klaus; Friedrich, Juergen; Zierenberg, Bernd, Germany (Federal Republic of)/Allemagne (Republique Federale de)

[73] Siemens Aktiengesellschaft and Boehringer Ingelheim KG, Germany (Federal Republic of)/Allemagne (Republique Federale de)

[22] 891211

[43] 900613

[30] EPO/EOB (88120823-5) 881213

[57] Claims 16 Revendications

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[*] SHAW, A.S.W.

UK 2,227,659(A)
8/8/90

Nicotine-containing lozenge

The lozenge is formed by compression of at least two mixed components, one of which a filler and the other a dispersion of nicotine and a fat or an essential oil, e.g. vanilla oil, in a carrier such as a silica preparation or a micro-cellulose material. [8 Pages including no Figure Pages] [9 Claims].
Priority: U.K. 6/12/88 28,468. (Appln. 6/12/89 27,618).

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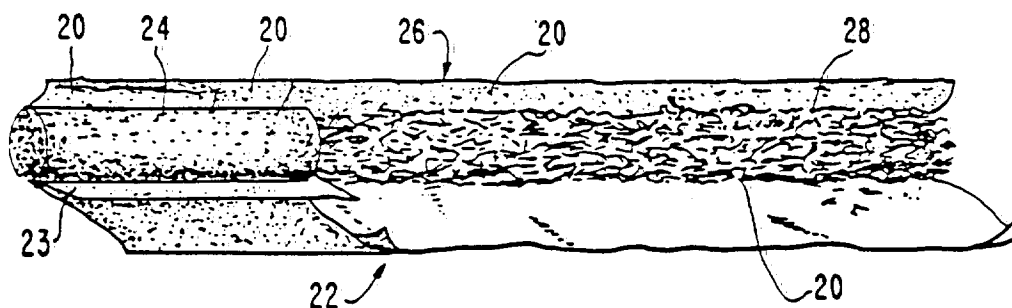
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| <p>(51) International Patent Classification⁴: A24B 15/30, A24C 5/47 A24D 1/02</p> | <p>(11) International Publication Number: WO 89/ 06911</p> <p>(43) International Publication Date: 10 August 1989 (10.08.89)</p> |
| <p>(21) International Application Number: PCT/US88/00204</p> <p>(22) International Filing Date: 28 January 1988 (28.01.88)</p> <p>(71) Applicant: C.A. BLOCKERS, INC. [US/US]; 2340 Meidinger Tower, Louisville Galleria, Louisville, KY 40202 (US).</p> <p>(72) Inventors: WADDELL, William, J. ; 6604 Gunpowder Lane, Prospect, KY 40059 (US). MARLOWE, Carolyn ; 6604 Gunpowder Lane, Propect, KY 40059 (US). KEENEY, L., Douglas ; 54 Tepee Road, Louisville, KY 40207 (US).</p> <p>(74) Agents: BOLAND, Thomas, R. et al.; Vorys, Sater, Seymour & Pease, Suite 1111, 1828 L Street, N.W., Washington, DC 20036-5104 (US).</p> | <p>(81) Designated States: AT, AT (European patent), AU, BB, BE (European patent), BG, BJ (OAPI patent), BR, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CM (OAPI patent), DE, DE (European patent), DK, FI, FR (European patent), GA (OAPI patent), GB, GB (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC, MG, ML (OAPI patent), MR (OAPI patent), MW, NL, NL (European patent), NO, RO, SD, SE, SE (European patent), SN (OAPI patent), SU, TD (OAPI patent), TG (OAPI patent).</p> <p>Published With international search report.</p> <p>RECEIVED PHILIP MORRIS MANAGEMENT CORP. LAW DEPT.-PATENT SECTION</p> <p>SEP 25 1989</p> <p>NOTED <i>q. charles</i> <i>F. Friedman</i> <i>Ted Sander</i></p> |

(54) Title: PROCESS FOR MANUFACTURING CIGARETTES EMPLOYING PRESELECTED ALCOHOLS



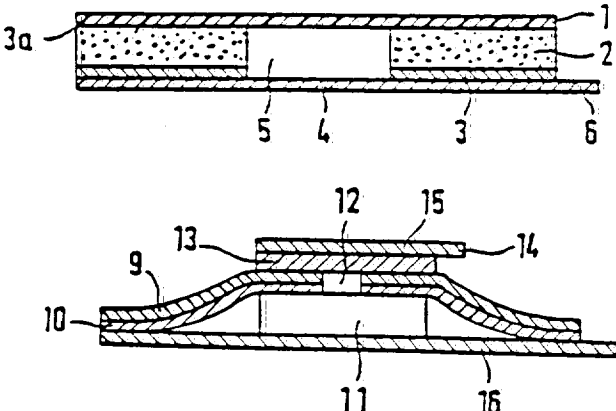
2026230635

(57) Abstract

A process for manufacturing cigarettes (22) which reduces health risks to smokers. According to this process redried cut rag tobacco (28) is sprayed with one or more preselected alcohols which are capable, when the vapors thereof are inhaled by the smoker, of inhibiting or blocking the selective localization of at least one nitrosamine and/or a metabolite thereof in the smoker's tissues such as those of the epithelial lining of his lungs. An example of such an alcohol is cyclohexanol in an ethyl alcohol solution. After the solution has been sprayed on the tobacco, the tobacco is machined in a conventional manner into the final cigarette (22), either filtered (24) or unfiltered. Upon smoking, the blocking alcohol is then heat released into the smoke stream, resulting in the desired blocking effect in the smoker, without noticeably altering the

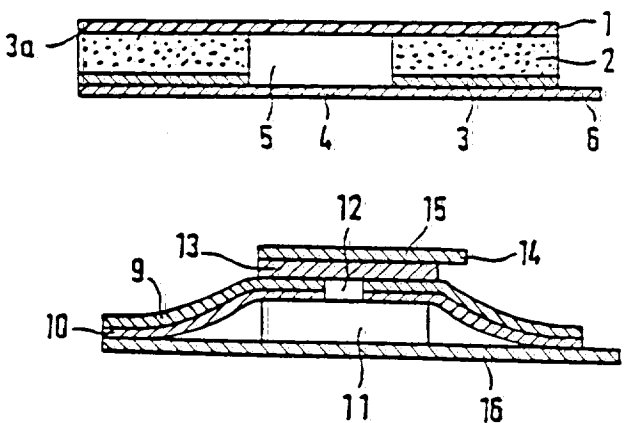
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| (21) Int. Application Number: PCT/JP89/01323 | (51) International Patent Classification ⁵ : A61K 9/20 | (11) Int. Publication Number: WO 90/07327 |
| (22) Int. Filing Date: 28 December 1989 (28.12.89) | A1 | (43) Int. Publication Date: 12 July 1990 (12.07.90) |
| (30) Priority data: 63/331821 28 December 1988 JP (28.12.88) | (54) Title: STRESS SCATTERING METHOD IN TABLETING | |
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| (72) Inventors; and: | This invention relates to a tableting composition containing minute gelatine balls and/or foams as stress scattering agents so as to minimize the disintegration of microcapsules or the transformation of medicine during tableting; and a stress scattering method in tableting. The use of the tableting composition according to the present invention enables tablets to be made without causing microencapsulated medicine powder, enzymes, germs or substances of a low melting point to be transformed or disintegrated. | |
| (75) Inventors/Applicants (for US only): YUASA, Hiroshi [JP/JP]; Higashigaoka Apartment Room 305, 12-1, Hatagaya 2-chome, Shibuya-ku, Tokyo 151 (JP). KANAYA, Yoshio [JP/JP]; 15-3, Nogata 5-chome, Nakano-ku, Tokyo 165 (JP). OMATA, Kazuki [JP/JP]; 22-6, Honchou 6-chome, Meguro-ku, Tokyo 152 (JP). | | |
| (74) Agent: KITAGAWA, Tomizou; Taisho Pharmaceutical Co., Ltd., 24-1, Takata 3-chome, Toshima-ku, Tokyo 171 (JP). | | |
| (81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European patent), US. | | |
| Published With international search report. | | |

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| (21) Int. Application Number: PCT/US89/05798 | (51) International Patent Classification ⁵ : A61K 9/70, A61L 15/00 | (11) Int. Publication Number: WO 90/07328 |
| (22) Int. Filing Date: 22 December 1989 (22.12.89) | A1 | (43) Int. Publication Date: 12 July 1990 (12.07.90) |
| (30) Priority data: P 38 44 247.7 29 December 1988 DE (29.12.88). | (54) Title: APPLICATION SYSTEM FOR DRUG CONTAINING MICROEMULSIONS | |
| (71) Applicant (for all designated States except US): RIKER LABORATORIES, INC. [US/US]; P.O. Box 33427, Saint Paul, MN 55133 (US). |  | |
| (72) Inventors; and (75) Inventors/Applicants (for US only): KRECKEL, Karl, W. [DE/DE]; Wilbecke 12-14, P.O. Box 1340, D-4280 Borken 1 (DE). ZERBE, Horst-Georg [DE/DE]; Wilhelm-Busch- Strasse 4, D-4281 Velen (DE). | (57) Abstract | |
| (74) Agents: SPRAGUE, Robert, W. et al.; Minne- sota Mining and Manufacturing Company, P.O. Box 33427, St. Paul, MN 55133-3427 (US). | The invention deals with devices, in particular with bandage strips, for a transdermal delivery of drugs to patients, whereby the drug formulations include highly viscous preparations, topical solutions of a low viscosity and micro-emulsions of a low viscosity containing the drugs. Depending on the consistency of the medium containing the drug, the drug formulation is stored in a reservoir, consisting, e.g., of a punched out cavity or of an absorbent piece of material, which is encased or supported by a carrier element (a formed material piece or a non-woven fleece tape) adhering to the skin by means of a skin-compatible adhesive, whereby specially formed protective films are applied at the filling and delivery side during the storage of the device to prevent a lateral migration, and whereby during its use, the device can be refilled with dosed amounts by the patient without requiring a removal of the device from the skin surface to be treated (Fig. 2). | |
| (81) Designated States: AT (European patent), AU, BE (European patent), CH (European pa- tent), DE (European patent), ES (European patent), FR (European patent), GB (Euro- pean patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US. | | |
| Published With international search report. | | |

A61K

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|---|--|---|
| (21) Int. Application Number: PCT/JP89/01323 | (51) International Patent Classification ⁵ : | (11) Int. Publication Number: WO 90/07327 |
| (22) Int. Filing Date: 28 December 1989 (28.12.89) | A61K 9/20 | A1 |
| (30) Priority data: 63/331821 28 December 1988 JP (28.12.88) | (43) Int. Publication Date: 12 July 1990 (12.07.90) | |
| (71) Applicant (for all designated States except US): TAISHO PHARMACEUTICAL CO., LTD. [JP/JP]; 24-1, Takata 3-chome, Toshima-ku, Tokyo 171 (JP). | (54) Title: STRESS SCATTERING METHOD IN TABLETING | |
| (72) Inventors; and: | (57) Abstract | |
| (75) Inventors/Applicants (for US only): YUASA, Hi- roshi [JP/JP]; Higashigaoka Apartment Room 305, 12-1, Hatagaya 2-chome, Shibuya- ku, Tokyo 151 (JP). KANAYA, Yoshio [JP/JP]; 15-3, Nogata 5-chome, Nakano-ku, Tokyo 165 (JP). OMATA, Kazuki [JP/JP]; 22-6, Honchou 6-chome, Meguro-ku, Tokyo 152 (JP). | This invention relates to a tableting composition containing minute gelatine balls and/or foams as stress scattering agents so as to minimize the disintegration of microcapsules or the transformation of medicine during tableting; and a stress scattering method in tableting. The use of the tableting composition according to the present invention enables tablets to be made without causing microencapsulated medicine powder, enzymes, germs or substances of a low melting point to be transformed or disintegrated. | |
| (74) Agent: KITAGAWA, Tomizou; Taisho Pharm- aceutical Co., Ltd., 24-1, Takata 3-chome, Toshima-ku, Tokyo 171 (JP). | | |
| (81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), ES (European pa- tent), FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European patent), US. | | |
| Published With international search report. | | |

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|---|---|---|
| (21) Int. Application Number: PCT/US89/05798 | (51) International Patent Classification ⁵ : | (11) Int. Publication Number: WO 90/07328 |
| (22) Int. Filing Date: 22 December 1989 (22.12.89) | A61K 9/70, A61L 15/00 | A1 |
| (30) Priority data: P 38 44 247.7 29 December 1988 DE (29.12.88) | (43) Int. Publication Date: 12 July 1990 (12.07.90) | |
| (71) Applicant (for all designated States except US): RIKER LABORATORIES, INC. [US/US]; P.O. Box 33427, Saint Paul, MN 55133 (US). | (54) Title: APPLICATION SYSTEM FOR DRUG CONTAINING MICROEMULSIONS | |
| (72) Inventors; and: |  | |
| (75) Inventors/Applicants (for US only): KRECKEL, Karl, W. [DE/DE]; Wilbecke 12-14, P.O. Box 1340, D-4280 Borken 1 (DE). ZERBE, Horst-Georg [DE/DE]; Wilhelm-Busch- Strasse 4, D-4281 Velen (DE). | | |
| (74) Agents: SPRAGUE, Robert, W. et al.; Minne- sota Mining and Manufacturing Company, P.O. Box 33427, St. Paul, MN 55133-3427 (US). | (57) Abstract | |
| (81) Designated States: AT (European patent), AU, BE (European patent), CH (European pa- tent), DE (European patent), ES (European patent), FR (European patent), GB (Euro- pean patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US. | The invention deals with devices, in particular with bandage strips, for a transdermal delivery of drugs to patients, whereby the drug formulations include highly viscous preparations, topical solutions of a low viscosity and micro-emulsions of a low viscosity containing the drugs. Depending on the consistency of the medium containing the drug, the drug formulation is stored in a reservoir, consisting, e.g., of a punched out cavity or of an absorbent piece of material, which is encased or supported by a carrier element (a formed material piece or a non-woven fleece tape) adhering to the skin by means of a skin-compatible adhesive, whereby specially formed protective films are applied at the filling and delivery side during the storage of the device to prevent a lateral migration, and whereby during its use, the device can be refilled with dosed amounts by the patient without requiring a removal of the device from the skin surface to be treated (Fig. 2). | |
| Published With international search report. | | |

with said essential oil-containing herb which maintains said herb in a moist coherent cud during chewing.

2. The chewing composition of claim 1 which further comprises a flavorant and a coloring agent.

3. The chewing composition of claim 2 wherein said flavor component is selected from the group consisting of natural and artificial sweeteners, flavoring agents, spices, fruit flavors, and mixtures thereof.

4. The chewing composition of claim 2 wherein said color component is selected from the group consisting of caramel and other food grade coloring agents.

5. The chewing composition of claim 2 wherein said herb component is present in the composition of the final product in an amount of from about 40% to about 60% by weight, said casing component is present in an amount of from about 8% to about 35% by weight, said flavor component is present in an amount from about 4% to about 26% by weight, and said color component is present in an amount of from about 0.25% to about 5% by weight.

6. The chewing composition of claim 5 wherein said herb component is present in an amount of about 45% to about 55% by weight, said casing component is present in an amount of from about 15% to about 28% by weight, said flavor component is present in an amount of about 8% to about 20% by weight, and said color component is present in an amount of about 0.8% to about 3.0% by weight.

7. The chewing composition of claim 1 wherein said preservative is selected from the group consisting of a salt, powdered dandelion root, echinacea, clove powder, and mixtures thereof.

8. The chewing composition of claim 1 wherein said binder is selected from a group consisting of molasses, corn syrup, hydrogenated starch hydrolysates, and mixtures thereof.

9. The chewing composition of claim 1 wherein said humectant is selected from the group consisting of glycerin, sorbitol, invert sugar, and other moisture-maintaining materials.

10. The chewing composition of claim 1 which further comprises a bio-affecting agent.

11. The chewing composition of claim 10 wherein said bio-affecting agent is selected from the group consisting of mineral supplements, analgesics, antipyretics, antiarrhythmics, ion exchange resins, appetite suppressants, vitamins, anti-inflammatory substances, coronary dilators, cerebral dilators, peripheral vasodilators, anti-infectives, psychotropics, antimanics, stimulants, antihistamines, laxatives, decongestants, gastro-intestinal sedatives, antiarrheal preparations, anti-anginal drugs, vasodilators, anti-hypertensive drugs, vasoconstrictors and migraine treatments, antibiotics, tranquilizers, antipsychotics, antitumor drugs, anticoagulants and antithrombotic drugs, hypnotics, sedatives, anti-emetics, anti-nauseants, anticonvulsants, neuromuscular drugs, hyper and hypoglycaemic agents, thyroid and antithyroid preparations, diuretics, antispasmodics, uterine relaxants, nutritional additives, antiobesity drugs, anabolic drugs, erythropoietic drugs, antiasthmatics, expectorants, cough suppressants, nucleolytics, antineoplastic drugs and mixtures thereof.

12. A snuff composition comprising a nicotine-free herb containing essential oils capable of being encased and capable of being processed to a texture which is non-injurious to the surface of the oral cavity, said herb being clover, and a casing material which includes a preservative, a binder, and a humectant for combining

with said essential oil-containing herb which maintains said herb in a moist coherent cud in the mouth during use.

13. The snuff composition of claim 12 wherein said herb is hydrophilic and wherein said casing is adsorptive to said herb.

14. The snuff composition of claim 13 wherein said herb is red clover.

15. The snuff composition of claim 12 wherein said herb component is present in the final product in an amount of from about 25% to about 45% by weight, and said casing component is present in an amount of from about 35% to about 65% by weight.

16. The snuff composition of claim 15 wherein said herb component is present in an amount of from about 30% to about 40%, and said casing component is present in an amount of from about 40% to about 60%.

17. The snuff composition of claim 16 wherein said herb component is present in an amount of from about 32% to about 37% by weight, and said casing component is present in an amount of from about 45% to about 55% by weight.

18. The snuff composition of claim 12 wherein said preservative is selected from the group consisting of a salt, powdered dandelion root, echinacea, clove powder and mixtures thereof.

19. The snuff composition of claim 12 wherein said binder is selected from the group consisting of molasses, corn syrup, hydrogenated starch hydrolysates and mixtures thereof.

20. The snuff composition of claim 12 wherein said humectant is selected from the group consisting of glycerin, sorbitol, invert sugar, and other moisture-maintaining materials.

21. The snuff composition of claim 12 which further comprising a flavorant component, a color component, and an additional non-casing herbal binder component.

22. The snuff of claim 21 wherein said flavor component is present in an amount of from about 0.25% to about 7% by weight, said color component is present in an amount of from about 0.25% to about 5% by weight, and said additional binder component is present in an amount of from about 0.5% to about 5% by weight.

23. The snuff composition of claim 22 wherein said flavor component is present in an amount of from about 1.2% to about 5% by weight, said color component is present in an amount of from about 0.8% to about 3% by weight, and said additional binder component is present in an amount of from about 0.8% to about 3% by weight.

24. The snuff composition of claim 23 wherein said flavor component is present in an amount of from about 2.5% to about 4% by weight, said color component is present in an amount of from about 1.0% to about 1.3% by weight, and said additional binder component is present in an amount of about from 0.1% to about 2.0% by weight.

25. The snuff composition of claim 21 wherein said herbal binder component comprises an ingredient selected from the group consisting of gums, slippery elm, mallow, and mixtures thereof.

26. The process of claim 25 wherein said final moisture level is from about 19% to about 21%.

27. The snuff composition of claim 21 wherein said flavor component is selected from the group consisting of natural and artificial sweeteners, flavoring agents, fruit flavors, spices, and mixtures thereof.

2026230637

United States Patent [19]
Summers

[11] Patent Number: 4,817,640
[45] Date of Patent: Apr. 4, 1989

[54] HERBAL CHEW AND SNUFF
COMPOSITIONS

[75] Inventor: John K. Summers, Anderson, Ind.
[73] Assignee: Better Life International Life, Inc.,
Stuart, Fla.

[21] Appl. No.: 907,402

[22] Filed: Sep. 12, 1986

[51] Int. Cl.⁴ A24B 15/18

[52] U.S. Cl. 131/359; 131/352;
131/369

[58] Field of Search 131/359, 369

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Primary Examiner—V. Mullin

Assistant Examiner—J. Cheng

Attorney, Agent, or Firm—Hoffmann & Baron

[57] ABSTRACT

Compositions and methods for providing tobaccoless herbal chew and snuff products which include an herbal component capable of being encased with a casing material providing a coherent cud in the oral cavity during use. In particular the present invention contemplates the use of a nicotine-free herbal substitute, such as red clover in the case of snuff and dandelion leaf in the case of chew, which can be encased with, among other things, a binder to provide a coherent cud in the mouth during use. As a result of this invention, safe nicotine-free snuff and chew compositions can be provided.

39 Claims, No Drawings

2026230638

United States Patent [19]
Ray et al.

[11] Patent Number: 4,800,903
[45] Date of Patent: Jan. 31, 1989

[54] NICOTINE DISPENSER WITH POLYMERIC
RESERVOIR OF NICOTINE

[76] Inventors: Jon P. Ray, 12544 Judson Rd., San
Antonio, Tex. 78233; James E.
Turner, 307 Wayside, San Antonio,
Tex. 78213; Michael P. Ellis, 811
River Rd., San Antonio, Tex. 78212;
Ronald G. Oldham, 1410 Tarton, San
Antonio, Tex. 78231

[21] Appl. No.: 738,120

[22] Filed: May 24, 1985

[51] Int. Cl.⁴ A24D 1/00; A24D 3/08;
A24F 1/00

[52] U.S. Cl. 131/273; 131/270;
131/335; 128/202.21

[58] Field of Search 131/332, 270, 273, 331,
131/335, 343, 341; 128/202.21

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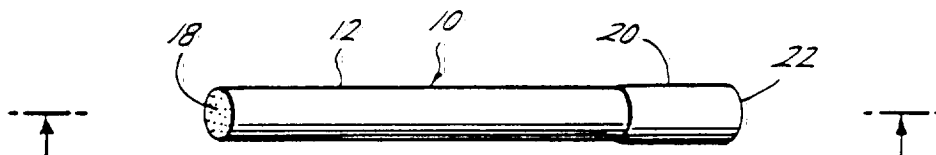
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Arnold, White & Durkee

[57] ABSTRACT

A nicotine dispenser comprising a polyolefin porous
plug with reversibly retained nicotine therein. The dis-
penser is mounted in a tubular configuration to provide
a cigarette-shaped product adapted to dispense nicotine
vapor when air is drawn therethrough. The polymeric
reservoir of nicotine comprises a polyolefin, preferably
polyethylene or polypropylene, which reversibly ab-
sorbs nicotine.

39 Claims, 1 Drawing Sheet



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LAW DEPT.—PATENT COUNCIL

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APPENDIX N

Resource Allocations

By Program

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| DIRECT 1990 | Proj Tot' | Percent Admin | Ard | Bcr | Cad | Chm | Cigdev | Cigtec | Ctsd | Deveng | Fladev | Red | Phy | STS/TA | Tis | Tobfun | Tobmatl | Tobpf | Ex/Admin |
|--------------------------------|-----------|---------------|------|-------|-------|------|--------|--------|-------|--------|--------|------|-------|--------|-----|--------|---------|-------|----------|
| OPERATIONS SUPPORT | 63.35 | 0.15 | | | | | | 0.00 | | | | | | | | | | | |
| Cigarette Monitoring | | 1.53 | | 0.50 | | | 0.03 | | 0.50 | | | | | | | | | | 0.5 |
| Materials Evaluation | | 8.28 | | 4.00 | | 0.05 | 0.03 | 3.00 | 0.00 | | | | | | | | | | 1.2 |
| Customer Complaints-T/O/S | | 1.83 | | 1.00 | | | 0.03 | 0.70 | | | | 0.10 | | | | | | | |
| Flavor Dev/Analytical Sup | | 1.83 | | | | | 0.03 | | | | | 0.60 | | 0.10 | | | | | 1.1 |
| Alt Humectants/Preserv | | 5.28 | 0.50 | 4.35 | | | 0.03 | | | | | 0.10 | | | | | 0.10 | | 0.2 |
| Micro Quality Improv | | 2.68 | | 2.55 | | | 0.03 | | | | | | | | | | | | 0.1 |
| Env Compliance/Mono Inks | | 3.88 | | | | | 0.03 | | | | | | 3.00 | 0.75 | | | | | 0.1 |
| Semiworks Support | | 17.13 | | | | | 0.03 | | 2.00 | | | 0.10 | | | | | | | 15 |
| Burley Spray/Dry Flavors | | 0.53 | | | | | 0.03 | | | | | 0.10 | | | | | | | 0.3 |
| Flavor Specs/Certs | | 7.03 | 3.00 | | | | 0.03 | | 3.00 | | | 0.50 | | | | | 0.10 | | 0.5 |
| Environmental Tob Smok | | 2.03 | | 2.00 | | | 0.03 | | | | | | | | | | | | |
| Entomological Support | | 6.28 | | 4.25 | | | 0.03 | | | | | | | | | | | | |
| Project Warhol | | 0.73 | | 0.50 | | | 0.03 | | | | | | | | | | | 0.20 | |
| Engineering Stud/Methods | | 2.03 | | 1.50 | | | 0.03 | | 0.50 | | | | | | | | | | |
| Recon Sheet Certification | | 0.73 | | 0.50 | | | 0.03 | | | | | 0.10 | | | | | | 0.10 | |
| Cooperative Leaf Studies | | 1.53 | 1.00 | | | 0.50 | 0.03 | | | | | | | | | | | | |
| PROJECT TOMORROW | 7.60 | 7.60 | 0.02 | | | 0.35 | 1.00 | 0.55 | 0.50 | | | | 2.50 | 0.00 | | | 0.70 | | 2 |
| OPTICAL PROCESSING | 5.75 | 5.75 | 0.01 | | | | | | | | | | 5.50 | 0.10 | | | | | 0.15 |
| NEW EXPANSION PROCESS | 23.15 | 23.15 | 0.06 | 1.00 | | 0.20 | | | | | | 0.85 | 5.00 | 0.60 | | 9.00 | 4.50 | | 2 |
| CAST SHEET RCB PROCESS | 9.40 | 9.40 | 0.02 | 1.50 | | | | 0.30 | 0.50 | | | 0.70 | | 0.60 | | | 4.80 | | 1 |
| PROJECT ART | 48.65 | | 0.12 | | | | | | | | | | | | | | | | |
| Art Sup of Current proc | | 28.22 | | 5.50 | 1.60 | | 1.05 | 1.00 | 0.60 | 1.00 | | 1.37 | 1.50 | | | | 5.90 | | 8.7 |
| Art Process Development | | 20.43 | | 10.00 | | 0.30 | 1.05 | | | | | 1.38 | | | | | 7.70 | | |
| Art Total | | 0.00 | | | | | | | | | | | | | | | | | |
| PROJECT DELTA/SIGMA/BETA | 35.80 | 35.80 | 0.09 | 0.50 | | 0.50 | 0.10 | | 11.00 | | | 2.50 | 13.00 | 1.80 | | 5.20 | 0.30 | | 0.9 |
| TSNA | 19.20 | 19.20 | 0.05 | | | | 0.10 | | | | | | | | | | | | |
| LHA | 14.35 | 14.35 | 0.03 | 0.50 | 19.10 | | 0.10 | | | | | | | | | | | | |
| REDUCED SS/PAPER TECH | 36.65 | 36.65 | 0.09 | 7.00 | 13.75 | | 0.10 | | | | | | | | | | | | |
| PROJECT AMBROSIA/ASH TRAY ODOR | 7.35 | 7.35 | 0.02 | 1.00 | 1.10 | | 0.50 | 4.05 | | | | 0.75 | 1.00 | 0.90 | | | 2.40 | | 2.95 |
| PROJECT PACT | 2.80 | 2.80 | 0.01 | 1.00 | 0.20 | | 1.50 | 1.00 | | | | 0.75 | | 0.10 | | 0.50 | | | 0.2 |
| LOW TAR/HIGH FLAVOR | 9.35 | 9.35 | 0.02 | 1.00 | 0.60 | | 0.95 | 2.00 | 1.50 | 0.50 | | 2.00 | | 0.80 | | | 1.00 | | 0.8 |
| FILTER RESEARCH | 8.45 | | 0.02 | | | | | | | | | | | | | | | | |
| Domestic | | 6.95 | | 0.50 | | | 0.05 | | 3.00 | 0.50 | | 0.30 | 1.50 | | | | 0.60 | | 0.5 |
| International | | 1.50 | | | | | | 1.50 | | | | | | | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | 58.55 | 58.55 | 0.14 | 0.50 | | 0.30 | 3.25 | 1.85 | 14.00 | | | 3.05 | 23.30 | 1.00 | | | 1.50 | | 9.8 |
| INTERNATIONAL PRODUCT SUPPORT | 62.05 | | | | | | | | | | | | | | | | | | |
| PM USA | | 17.05 | 0.04 | 1.50 | | 0.30 | 0.20 | | 1.30 | 2.00 | | 1.95 | 1.00 | | | | | | 8.8 |
| PM PI | | 45.00 | | | | | | 19.00 | | 22.00 | | 2.00 | 2.00 | | | | | | 0.8 |
| PROJECT NATURAL | 1.50 | 1.50 | 0.00 | | | | 0.50 | | | | | 0.20 | | | | | | | |
| INGREDIENTS | 2.00 | 2.00 | 0.00 | | | | | | | | | | | | | | | | |
| ENVIRONMENTAL ISSUES | 5.55 | 5.55 | 0.01 | 5.00 | | | 0.25 | | | | | 0.20 | | 2.00 | | | | | |
| MENTHOL | 6.00 | 6.00 | 0.01 | | | | 0.90 | 0.50 | 0.30 | 0.50 | | 1.00 | 0.50 | 0.10 | | 0.30 | 2.00 | | 0.5 |
| REDUCED TAR & NICOTINE INTL | 1.70 | 1.70 | 0.00 | | | | | 0.50 | 0.50 | | | 0.20 | | | | | | | |
| SELECTIVE FILTRATION | 1.40 | 1.40 | 0.00 | | | | | 0.40 | | | | | 1.00 | | | | | | |
| NEW PACKAGING CONCEPTS | 0.20 | 0.20 | 0.00 | | | | | 0.20 | | | | | | | | | | | |
| PROCESS DEV STUDIES | 1.90 | 1.90 | 0.00 | | | | | | | | | | | | | | | | |
| COMBUSTION RESEARCH | 0.60 | | 0.00 | | | | | | | | | | | | | | 1.00 | | 0.9 |
| Mass Burn Control | | 0.60 | | | | | 0.10 | | | | | | 0.50 | | | | | | |
| Pyrolysis Temp Control | | 0.00 | | | | | | | | | | | | | | | | | |
| FLAVORS | 6.05 | | 0.01 | | | | | | | | | | | | | | | | |
| Thermal Flavor Release | | 3.09 | | 1.00 | | | 1.44 | 0.45 | | | | 0.20 | | | | | | | |
| Flavor Formation Studies | | 1.32 | | | | | 0.32 | | | | | 1.00 | | | | | | | |
| Fragrances | | 0.52 | | | | | 0.32 | | | | | 0.20 | | | | | | | |
| Volatile Flavors | | 1.12 | | | | | 0.32 | | | | | 0.80 | | | | | | | |
| AEROSOLS | 4.65 | | 0.01 | | | | | | | | | | | | | | | | |
| Formation Mechanisms | | 3.65 | | | | 1.00 | 1.35 | 0.30 | | | | | 1.00 | | | | | | |
| Short Lived Aerosols | | 1.00 | | | | | | | | | | | 1.00 | | | | | | |
| SELECTIVE SEPARATIONS | 2.45 | | 0.01 | | | | | | | | | | | | | | | | |
| Supercritical Technology | | 2.00 | | 1.00 | | | | | | | | | 1 | | | | | | |
| Membrane Separation | | 0.45 | | | | | 0.45 | | | | | | | | | | | | |
| CONSUMER TESTING RESEARCH | 2.50 | | 0.01 | | | | | | | | | | | | | | | | |
| Regression Based Mod of Lik | | 1.50 | | | | | | | | | | | 1.50 | | | | | | |
| Stochastic Discrimination Mo | | 0.30 | | | | | | | | | | | 0.30 | | | | | | |

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| | Proj Tot | Percent Admin | Ard | Bcr | Cad | Chm | Cigdev | Cigtec | Ctsd | Deveng | Fladev | Ped | Phy | STS/TA | Tis | Tobfun | Tobmati | Tobpf | Ex/Admin | |
|-------------------------------|----------|---------------|-------|-------|-------|-------|--------|--------|-------|--------|--------|-------|-------|--------|------|--------|---------|-------|----------|-------|
| DIRECT 1990 | | | | | | | | | | | | | | | | | | | | |
| Cost/Benefit Eval | 0.50 | | | | | | | | | | | | | | | | | | | |
| Quant Mod of Market Dynamics | 0.20 | | | | | | | | | | | | 0.50 | | | | | | | |
| CHEMICAL SENSES | 1.85 | 0.00 | | | | | | | | | | | 0.20 | | | | | | | |
| Electrophysiological Stud | 1.60 | | | | 1.20 | 0.40 | | | | | | | | | | | | | | |
| Trigeminal Stud | 0.20 | | | | 0.20 | | | | | | | | | | | | | | | |
| Odor Panel | 0.00 | | | | | | | | | | | | | | | | | | | |
| Room Odor Panel | 0.00 | | | | | | | | | | | | | | | | | | | |
| Flav Response/ Chm Aspects | 0.00 | | | | | | | | | | | | | | | | | | | |
| Struct-Act Relationships | 0.05 | | | | | | | | | | | | | | 0.05 | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | 2.50 | 0.01 | 1.50 | | | | | | | | | | 1.00 | | | | | | | |
| Process Control Sys | 0.00 | | | | | | | | | | | | | | | | | | | |
| BIOLOGICAL | 3.20 | 0.01 | | | | | | | | | | | | | | | | | | |
| Bioconversion | 1.55 | | | | 1.50 | 0.05 | | | | | | | | | | | | | | |
| Antibodies | 1.65 | | | | 1.60 | 0.05 | | | | | | | | | | | | | | |
| Biosensors | 0.00 | | | | | | | | | | | | | | | | | | | |
| COMPUTING SYSTEMS | 2.80 | 0.01 | | | | | | | | | | | | | | | | | | |
| Expert Sys & Neural Net | 2.80 | | | | 2.00 | | | 0.50 | | | | 0.20 | | 0.10 | | | | | | |
| Optical Computing | 0.00 | | | | | | | | | | | | | | | | | | | |
| BASIC ANALYTICAL RESEARCH | 1.50 | 0.00 | 1.50 | | | | | | | | | | | | | | | | | |
| New Project 1 | 0.00 | | | | | | | | | | | | | | | | | | | |
| New Project 2 | 0.00 | | | | | | | | | | | | | | | | | | | |
| New Project 3 | 0.00 | | | | | | | | | | | | | | | | | | | |
| New Project 4 | 0.00 | | | | | | | | | | | | | | | | | | | |
| New Project 5 | 0.00 | | | | | | | | | | | | | | | | | | | |
| | | 1.00 | | | | | | | | | | | | | | | | | | |
| Total Support | 161.20 | | 28.00 | 0.00 | 0.00 | 28.40 | 2.70 | 0.00 | 0.00 | 11.00 | 28.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11.00 | 0.00 | 9.10 | 0.00 | 43.00 |
| Total Direct | 415.80 | | 0.00 | 58.00 | 52.00 | 4.60 | 28.30 | 11.00 | 33.00 | 26.00 | 0.00 | 21.00 | 27.00 | 39.00 | 9.00 | 0.00 | 15.00 | 32.90 | 59.00 | 0.00 |
| Total Direct & Support | 577.00 | | 28.00 | 58.00 | 52.00 | 33.00 | 31.00 | 11.00 | 33.00 | 37.00 | 28.00 | 21.00 | 27.00 | 39.00 | 9.00 | 11.00 | 15.00 | 42.00 | 59.00 | 43.00 |
| Allocated Total | 0.00 | | | | | | | | | | | | | | | | | | | |

2026230643

| DIRECT 1991 | TOTAL | ADMIN | ARD | BCR | CAD | CHM | CIGDEV | CIGTEC | CTSD | DEVENG | FLADEV | PED | PHY | STS-TA | TIS | TOBFUN | TOBMATL | TOBPF | EX/ADMIN |
|--------------------------------|-------|-------|------|-------|------|-------|--------|--------|-------|--------|--------|-------|-------|--------|-----|--------|---------|-------|----------|
| OPERATIONS SUPPORT | | | | | | | | | 0.00 | | | | | | | | | | |
| Adhesives | 2.60 | | 2.00 | | | | | | | | 0.20 | | | | | | | | 0.40 |
| Cigarette Monitoring | 1.20 | | | | | | | | 0.50 | | 0.10 | | | | | | | | 0.10 |
| Materials Evaluation | 5.20 | | 3.50 | | | 0.05 | 0.25 | 0.00 | | | | | | 0.20 | | | | | 1.20 |
| Customer Complaints-T/O/S | 1.90 | | 1.00 | | | | | 0.70 | | | 0.10 | | | 0.10 | | | | | |
| Flavor Dev/Analytical Sup | 1.40 | | | | | | | | | | 0.20 | | | 0.10 | | | | | 1.10 |
| Marlboro Standardization | 5.75 | | 1.00 | | | | 0.25 | | 3.00 | | 1.00 | | | | | | | | 0.50 |
| Alt Humectants/Preserv | 1.55 | | | 1.25 | | | | | | | 0.10 | | | | | | | | 0.20 |
| Micro Quality Improv | 4.20 | | | 4.10 | | | | | | | | | | | | | | | 0.10 |
| Monogram Inks | 1.00 | | | | | | | | | | | | 1.00 | | | | | | |
| Packaging - Inks & Solvents | 3.95 | | 1.00 | | | | | 2.75 | | | 0.20 | | | | | | | | |
| Semiworks Support | 17.10 | | | | | | | | 2.00 | | 0.10 | | | | | | | | 15.00 |
| Burley Spray/Dry Flavors | 0.40 | | | | | | | | | | 0.10 | | | | | | | | 0.30 |
| Flavor Specs/Certs | 2.30 | | 1.50 | | | | | | | | 0.60 | | | 0.20 | | | | | |
| ETS Studies | 1.10 | | 1.00 | | | | | | | | | | | 0.10 | | | | | |
| Entomological Support | 5.30 | | 1.00 | 4.30 | | | | | | | | | | | | | | | |
| Project Warhol | 0.00 | | | 0.00 | | | | | | | | | | | | | | | |
| Engineering Stud/Methods | 3.00 | | 2.50 | | | | | | 0.50 | | 0.00 | | | | | | | | |
| Recon Sheet Certification | 0.00 | | | | | | | | | | 0.00 | | | | | | | | |
| Cooperative Leaf Studies | 2.00 | | 1.50 | | | 0.50 | | | | | | | | | | | | | |
| Environmental Issues | 6.00 | | 4.50 | 1.00 | | | | | | | 0.30 | | | 0.10 | | | | | 0.10 |
| PROJECT TOMORROW | 15.45 | | 1.00 | | 0.20 | 0.35 | 2.00 | 1.25 | 0.50 | 0.20 | 1.25 | | 6.50 | 0.20 | | | | | 2.00 |
| OPTICAL PROCESSING | 6.35 | | | | | | | | | 0.20 | | | 6.00 | | | | | | 0.15 |
| NEW EXPANSION PROCESS | 36.95 | | 3.00 | | 0.20 | | | | | 3.50 | 0.85 | | 8.00 | 0.70 | | 11.70 | 7.00 | | 2.00 |
| CAST LEAF RCB PROCESS | 13.80 | | 2.00 | | | | | | 0.50 | 0.80 | 0.70 | | | 0.40 | | | 8.40 | | 1.00 |
| PROJECT ART | | | | | | | | | 0.00 | | | | | | | | | | |
| Art Sup of Current proc | 19.60 | | 3.00 | 0.25 | | 1.05 | 1.00 | 0.25 | | 0.40 | 0.25 | | 0.50 | | | | 3.20 | | 8.70 |
| Art Process Development | 17.25 | | 4.00 | 0.40 | 0.20 | 1.05 | | | 1.00 | 1.10 | 1.00 | | 0.50 | | | | 9.00 | | |
| Art Total | | | | | | | | | | | | | | | | | | | |
| PROJECT BETA | 28.75 | | 2.00 | | 0.40 | 0.10 | | | | 1.70 | 0.25 | | 21.00 | | | 3.30 | | | |
| PROJECT SIGMA | 1.00 | | | | | | | 0.10 | | | 0.00 | | | | | | | | 0.90 |
| TSNA | 18.50 | | | 18.40 | | 0.10 | | | | | | | | | | | | | |
| LBA | 11.20 | | 0.50 | 10.40 | | 0.10 | | | | | | | | 0.20 | | | | | |
| REDUCED SS/PAPER TECH | 36.85 | | 6.50 | 1.10 | 0.20 | 13.00 | 0.25 | 11.25 | | | 0.60 | | | 1.00 | | | | | 2.95 |
| PROJECT AMBROSIA/ASH TRAY ODOR | 8.25 | | 2.00 | 0.10 | | 2.10 | 1.75 | 1.00 | | | 1.00 | | | 0.10 | | | | | 0.20 |
| PROJECT PACT | 2.70 | | | | | | | | | 0.40 | | | 0.50 | 0.80 | | | 1.00 | | |
| LOW TAR/HIGH FLAVOR | 10.60 | | 1.00 | 1.50 | | 0.95 | 2.00 | 1.00 | 0.50 | | 2.35 | | | | | | 0.50 | | 0.80 |
| FILTER RESEARCH | 0.00 | | | | | | | | | | 0.00 | | | | | | | | 0.00 |
| Domestic | 5.55 | | 0.50 | | 0.20 | 0.05 | | 3.00 | 0.50 | | 0.30 | | 0.50 | | | | | | 0.50 |
| International | 1.50 | | | | | | | 1.50 | | | 0.00 | | | | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | 61.20 | | 1.00 | | 0.30 | | 4.00 | 1.75 | 14.00 | | 4.15 | 24.30 | | 0.90 | | | 1.00 | | 9.80 |
| INTERNATIONAL PRODUCT SUPPORT | 0.00 | | | | | | | | | | | | | | | | 0.00 | | 0.00 |
| PM USA | 17.80 | | 1.50 | | 0.30 | 0.20 | | 1.50 | 2.00 | | 2.00 | 1.00 | | | | | 0.50 | | 8.80 |
| PM FI | 41.00 | | | | | | 15.00 | | 22.00 | | 2.00 | 2.00 | | | | | | | |
| PROJECT NATURAL | 1.50 | | | | | | 0.50 | | | | 0.20 | | | | | | | | 0.80 |
| INGREDIENTS | 2.80 | | | 0.20 | | | | | | | | | | | | | | | |
| MENTHOL | 5.90 | | | | | 0.90 | 0.50 | 0.30 | 0.50 | 1.20 | 2.00 | | | 2.60 | | | 0.50 | | |
| REDUCED TAR & NICOTINE INTL | 1.70 | | | | | | | 0.50 | 0.50 | | 0.20 | | | | | | | | 0.50 |
| SELECTIVE FILTRATION | 2.40 | | 1.50 | | | | | 0.40 | | | | | 0.50 | | | | | | |
| NEW PACKAGING CONCEPTS | 0.20 | | | | | | | 0.20 | | | | | | | | | | | |
| PROCESS DEV STUDIES | 2.00 | | | | | | | 1.10 | | | | | | | | | 0.00 | | 0.90 |
| COMBUSTION RESEARCH | | | | | | | | | | | | | | | | | | | |
| Mass Burn Control | 1.10 | | | | | 0.10 | | | | | | | 1.00 | | | | | | |
| Pyrolysis Temp Control | 0.00 | | | | | | | | | | | | | | | | | | |
| FLAVORS | | | | | | | | | | | | | | | | | | | |
| Thermal Flavor Release | 3.35 | | 0.50 | | | | 1.60 | 0.25 | | | 1.00 | | | | | | | | |
| Flavor Formation Studies | 1.20 | | | | | | 0.20 | | | | 1.00 | | | | | | | | |
| Fragrances | 0.25 | | | | | | 0.20 | | | | 0.05 | | | | | | | | |
| Volatile Flavors | 0.85 | | | | | | 0.40 | | | | 0.45 | | | | | | | | |
| AEROSOLS | | | | | | | | | | | | | | | | | | | |
| Formation Mechanisms | 4.55 | | | | 1.00 | 1.35 | | 0.20 | | | | | 2.00 | | | | | | |
| Short Lived Aerosols | 1.00 | | | | | | | | | | | | 1.00 | | | | | | |
| SELECTIVE SEPARATIONS | | | | | | | | | | | | | | | | | | | |
| Supercritical Technology | 2.40 | | 2.00 | 0.40 | | | | | | | | | | | | | | | |

2026230644

| | TOTAL | ADMIN | ARD | BCR | CAD | CHM | CIGDEV | CIGTEC | CTSD | DEVENG | FLADEV | RED | PHY | STS-ETA | TIS | TOBFUN | TOBMATL | TOBPF | EX/ADMIN |
|-------------------------------|--------|-------|-------|-------|-------|-------|--------|--------|-------|--------|--------|-------|-------|---------|-------|--------|---------|-------|----------|
| DIRECT 1991 | | | | | | | | | | | | | | | | | | | |
| Membrane Separation | 0.45 | | | | | | | | | | | | | | | | | | |
| CONSUMER TESTING RESEARCH | | | | | | | | | | | | | | | | | | | |
| Regression Based Mod of Lik | 1.50 | | | | | | | | | | | 1.50 | | | | | | | |
| Stochastic Discrimination Mo | 0.50 | | | | | | | | | | | 0.50 | | | | | | | |
| Cost/Benefit Eval | 0.50 | | | | | | | | | | | 0.50 | | | | | | | |
| Quant Mod of Market Dynamics | 0.20 | | | | | | | | | | | 0.20 | | | | | | | |
| CHEMICAL SENSES | | | | | | | | | | | | | | | | | | | |
| Electrophysiological Stud | 0.60 | | | 0.60 | | 0.00 | | | | | | | | | | | | | |
| Trigeminal Stud | 0.25 | | | 0.25 | | | | | | | | | | | | | | | |
| Odor Panel | 0.40 | | | | | 0.40 | | | | | | | | | | | | | |
| Room Odor Panel | 0.00 | | | | | | | | | | | | | | | | | | |
| Flav Response/Chm Aspects | 0.80 | | 0.50 | | | | | | | | | | | | 0.30 | | | | |
| Struct-Act Relationships | 0.20 | | | 0.20 | | | | | | | | | | | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | | | | | | | | | | | | | | | |
| Process Control Sys | 1.00 | | 1.00 | | | | | | | | | | | | | | | | |
| BIOLOGICAL | | | | | | | | | | | | | | | | | | | |
| Bioconversion | 3.25 | | 1.00 | 2.20 | | 0.05 | | | | | | | | | | | | | |
| Antibodies | 0.75 | | | 0.70 | | 0.05 | | | | | | | | | | | | | |
| Biosensors | 1.30 | | | 1.30 | | | | | | | | | | | | | | | |
| COMPUTING SYSTEMS | | | | | | | | | | | | | | | | | | | |
| Expert Sys & Neural Net | 2.00 | | | | 2.00 | | | | | | | | | | | | | | |
| Optical Computing | 0.00 | | | | | | | | | | | | | | | | | | |
| BASIC ANALYTICAL RESEARCH | 2.00 | | 2.00 | | | | | | | | | | | | | | | | |
| Plant Tissue Culture | 1.35 | | | 1.35 | | | | | | | | | | | | | | | |
| Processing Plt Sup | 0.40 | | | 0.00 | | | | | | 0.40 | | | | | 0.00 | | 0.00 | | |
| Biochemical Processing | 0.00 | | | | | | | | | | | | | | 0.00 | | | | |
| Alpha | 0.00 | | | | | | | | | | | | | | | | | | |
| Primary Improv | 4.00 | | | | | | | | | | | | | | | | | | |
| Recon Plt Sup | 2.90 | | | | | | | | | | | | | | | | 4.00 | | |
| | | | | | | | | | | | | | | | | | 2.90 | | |
| Total Support | 142.20 | 29.00 | 1.00 | 0.00 | 28.00 | 2.70 | 0.00 | 0.00 | 11.00 | 16.50 | 0.00 | 0.00 | 0.00 | 0.00 | 11.00 | 0.00 | 0.00 | 0.00 | 43.00 |
| Total Direct | 434.80 | 0.00 | 57.00 | 50.00 | 5.00 | 25.30 | 13.00 | 29.00 | 26.00 | 9.50 | 23.00 | 28.00 | 49.00 | 8.00 | 0.00 | 15.00 | 38.00 | 59.00 | 0.00 |
| Total Direct & Support | 577.00 | 29.00 | 58.00 | 50.00 | 33.00 | 28.00 | 13.00 | 29.00 | 37.00 | 26.00 | 23.00 | 28.00 | 49.00 | 8.00 | 11.00 | 15.00 | 38.00 | 59.00 | 43.00 |
| | 577.00 | | | | | | | | | | | | | | | | | | |
| | 434.80 | | | | | | | | | | | | | | | | | | |

2026230645

| DIRECT 1992 | TOTAL | ADMIN | ARD | BCR | CAD | CHM | CIGDEV | CIGTEC | CTSD | DEVENG | FLADEV | PED | PHY | STS-TA | TIS | TOBFUN | TOBMATL | TOBPF | EX/ADMIN |
|--------------------------------|-------|-------|------|-------|------|-------|--------|--------|-------|--------|--------|-------|-------|--------|-----|--------|---------|-------|----------|
| OPERATIONS SUPPORT | | | | | | | | | 0.00 | | | | | | | | | | |
| Adhesives | 4.60 | | 4.00 | | | | | | | | 0.20 | | | | | | | | 0.40 |
| Cigarette Monitoring | 1.20 | | | | | | | | 0.50 | | 0.10 | | | | | | | | 0.10 |
| Materials Evaluation | 5.20 | | 3.50 | | | | 0.05 | 0.25 | 0.00 | | | | | 0.20 | | | | | 1.20 |
| Customer Complaints-T/O/S | 1.90 | | 1.00 | | | | | 0.70 | | | | | | 0.10 | | | | | 0.10 |
| Flavor Dev/Analytical Sup | 1.90 | | | | | | | | | | 0.70 | | | 0.10 | | | | | 1.10 |
| Marlboro Standardization | 5.75 | | 1.00 | | | | 0.25 | | 3.00 | | 1.00 | | | | | | | | 0.50 |
| Alt Humectants/Preserv | 0.30 | | | 0.00 | | | | | | | 0.10 | | | | | | | | 0.20 |
| Micro Quality Improv | 6.10 | | | 6.00 | | | | | | | | | | | | | | | 0.10 |
| Monogram Inks | 0.00 | | | | | | | | | | | | | | | | | | |
| Packaging - Inks & Solvents | 3.95 | | 1.00 | | | | | 2.75 | | | 0.20 | | | | | | | | |
| Semiworks Support | 17.10 | | | | | | | | 2.00 | | 0.10 | | | | | | | | 15.00 |
| Burley Spray/Dry Flavors | 0.40 | | | | | | | | | | 0.10 | | | | | | | | 0.30 |
| Flavor Specs/Certs | 1.30 | | 0.50 | | | | | | | | 0.60 | | | | | | | | |
| ETS Studies | 1.10 | | 1.00 | | | | | | | | | | | 0.20 | | | | | |
| Entomological Support | 4.20 | | 1.00 | 3.20 | | | | | | | | | | 0.10 | | | | | |
| Project Warhol | 0.00 | | | 0.00 | | | | | | | | | | | | | | | |
| Engineering Stud/Methods | 3.00 | | 2.50 | | | | | | 0.50 | | 0.00 | | | | | | | | |
| Recon Sheet Certification | 0.00 | | | | | | | | | | 0.00 | | | | | | | | |
| Cooperative Leaf Studies | 2.00 | | 1.50 | | | | 0.50 | | | | | | | | | | | | |
| Environmental Issues | 12.85 | | 5.00 | 1.50 | | | 1.00 | | 1.00 | | 0.30 | | 1.00 | 0.30 | | 1.50 | 1.00 | | 0.25 |
| PROJECT TOMORROW | 17.95 | | 2.00 | | 0.20 | 0.35 | 2.50 | 1.50 | 0.50 | 0.20 | 1.50 | | 7.00 | 0.20 | | 1.00 | | | 1.00 |
| OPTICAL PROCESSING | 6.50 | | | | | | | | | 0.20 | | | 6.00 | | | | | | 0.30 |
| NEW EXPANSION PROCESS | 28.30 | | 3.00 | | 0.20 | | | | | 3.50 | 0.60 | | 6.00 | 0.80 | | 8.20 | 4.00 | | 2.00 |
| CAST LEAF RCB PROCESS | 21.25 | | 2.00 | | | | | | 1.00 | 0.80 | 0.50 | | | 0.50 | | | 15.60 | | 0.85 |
| PROJECT ART | | | | | | | | | 0.00 | | | | | | | | | | |
| Art Sup of Current proc | 9.40 | | 0.00 | 0.00 | | 0.00 | 0.50 | 0.25 | 0.00 | 0.40 | 0.25 | | | | | | 0.50 | | 7.50 |
| Art Process Development | 16.85 | | 3.00 | 0.50 | 0.20 | 1.05 | | | 0.00 | 1.10 | 1.00 | | | | | | 10.00 | | |
| Art Total | | | | | | | | | | | | | | | | | | | |
| PROJECT BETA | 33.50 | | 3.00 | | 0.40 | 0.10 | | | | 0.70 | 1.00 | | 25.00 | | | 3.30 | | | |
| PROJECT SIGMA | 0.80 | | | | | | | 0.00 | | | 0.00 | | | | | | | | 0.80 |
| TSNA | 18.45 | | 0.50 | 17.85 | | 0.10 | | | | | | | | | | | | | |
| LBA | 9.80 | | 0.50 | 9.00 | | 0.10 | | | | | | | | 0.20 | | | | | |
| REDUCED SS/PAPER TECH | 36.35 | | 6.00 | 1.50 | 0.20 | 12.00 | 0.25 | 12.25 | | | 0.25 | | | 1.00 | | | | | 2.90 |
| PROJECT AMBROSIA/ASH TRAY ODOR | 8.65 | | 2.50 | 0.10 | | 2.10 | 1.75 | 1.00 | | | 0.80 | | | 0.10 | | | | | 0.30 |
| PROJECT PACT | 0.60 | | | | | | | | | 0.00 | | | | 0.60 | | | 0.00 | | |
| LOW TAR/HIGH FLAVOR | 9.20 | | 1.00 | 1.00 | | 0.95 | 2.00 | 1.00 | 0.00 | | 2.35 | | | | | | | | 0.90 |
| FILTER RESEARCH | 0.00 | | | | | | | | | | | | | | | | | | 0.00 |
| Domestic | 7.30 | | 0.50 | | 0.20 | 1.10 | | 3.00 | 0.50 | | 0.30 | | 1.00 | | | | | | 0.70 |
| International | 1.50 | | | | | | | 1.50 | | | 0.00 | | | | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | 63.60 | | 1.00 | | 0.30 | | 3.75 | 2.00 | 14.00 | | 4.55 | 24.30 | | 0.90 | | 1.00 | 1.00 | 10.80 | |
| INTERNATIONAL PRODUCT SUPPORT | 0.00 | | | | | | | | | | | | | | | | 0.00 | | 0.00 |
| PM USA | 20.05 | | 1.50 | | 0.30 | 0.20 | | 1.75 | 2.00 | | 3.00 | 1.00 | | | | | 0.50 | | 9.80 |
| PM PI | 41.00 | | | | | | 15.00 | 0.50 | 22.00 | | 2.00 | 2.00 | | | | | | | 0.60 |
| PROJECT NATURAL | 1.30 | | | | | | | | | | 0.20 | | | | | | | | |
| INGREDIENTS | 2.90 | | | 0.50 | | | | | | | | | | 2.40 | | | | | |
| MENTHOL | 6.15 | | | | | 0.90 | 0.75 | 0.30 | 0.50 | 1.20 | 2.00 | | | | | | 0.50 | | |
| REDUCED TAR & NICOTINE INTL | 1.70 | | | | | | | 0.50 | 0.50 | | 0.20 | | | | | | | | 0.50 |
| SELECTIVE FILTRATION | 4.25 | | 1.50 | | | 1.00 | | 0.75 | | | | | 1.00 | | | | | | |

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| | TOTAL | ADMIN | ARD | BCR | CAD | CHM | CIGDEV | CIGTEC | CTSD | DEVENG | FLADEV | PED | PHY | STS-TA | TIS | TOBFUN | TOBMAIL | TOBPF | EX/ADMIN |
|-------------------------------|--------|-------|-------|-------|-------|-------|--------|--------|-------|--------|--------|-------|-------|--------|-------|--------|---------|-------|----------|
| DIRECT 1992 | | | | | | | | | | | | | | | | | | | |
| NEW PACKAGING CONCEPTS | 0.20 | | | | | | | | | | | | | | | | | | |
| PROCESS DEV STUDIES | 2.00 | | | | | | | | | | | | | | | | | | |
| COMBUSTION RESEARCH | | | | | | | | 1.10 | | | | | | | | 0.00 | | 0.90 | |
| Mass Burn Control | 1.10 | | 0.00 | | | 0.10 | | | | | | | 1.00 | | | | | | |
| Pyrolysis Temp Control | 2.00 | | 1.00 | | | 1.00 | | | | | | | | | | | | | |
| FLAVORS | | | | | | | | | | | | | | | | | | | |
| Thermal Flavor Release | 3.85 | | 1.00 | | | 1.60 | | 0.25 | | | 1.00 | | | | | | | | |
| Flavor Formation Studies | 1.20 | | | | | 0.20 | | | | | 1.00 | | | | | | | | |
| Fragrances | 0.25 | | | | | 0.20 | | | | | 0.05 | | | | | | | | |
| Volatile Flavors | 0.85 | | | | | 0.40 | | | | | 0.45 | | | | | | | | |
| AEROSOLS | | | | | | | | | | | | | | | | | | | |
| Formation Mechanisms | 4.55 | | | | 1.00 | 1.35 | | 0.20 | | | | | 2.00 | | | | | | |
| Short Lived Aerosols | 1.00 | | | | | | | | | | | | 1.00 | | | | | | |
| SELECTIVE SEPARATIONS | | | | | | | | | | | | | | | | | | | |
| Supercritical Technology | 3.10 | | 3.00 | 0.10 | | | | | | | | | | | | | | | |
| Membrane Separation | 0.45 | | | | | 0.45 | | | | | | | | | | | | | |
| CONSUMER TESTING RESEARCH | | | | | | | | | | | | | | | | | | | |
| Regression Based Mod of Lik | 1.50 | | | | | | | | | | | 1.50 | | | | | | | |
| Stochastic Discrimination Mo | 0.50 | | | | | | | | | | | 0.50 | | | | | | | |
| Cost/Benefit Eval | 0.50 | | | | | | | | | | | 0.50 | | | | | | | |
| Quant Mod of Market Dynamics | 0.20 | | | | | | | | | | | 0.20 | | | | | | | |
| CHEMICAL SENSES | | | | | | | | | | | | | | | | | | | |
| Electrophysiological Stud | 1.00 | | | 1.00 | | 0.00 | | | | | | | | | | | | | |
| Trigeminal Stud | 0.75 | | | 0.75 | | | | | | | | | | | | | | | |
| Odor Panel | 0.40 | | | | | 0.40 | | | | | | | | | | | | | |
| Room Odor Panel | 0.00 | | | | | | | | | | | | | | | | | | |
| Flav Response/ Chm Aspects | 1.80 | | 1.00 | 0.50 | | | | | | | | | | 0.30 | | | | | |
| Struct-Act Relationships | 0.50 | | | 0.50 | | | | | | | | | | | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | | | | | | | | | | | | | | | |
| Process Control Sys | 1.00 | | 1.00 | | | | | | | | | | | | | | | | |
| BIOLOGICAL | | | | | | | | | | | | | | | | | | | |
| Bioconversion | 3.05 | | 1.00 | 2.00 | | 0.05 | | | | | | | | | | | | | |
| Antibodies | 1.05 | | | 1.00 | | 0.05 | | | | | | | | | | | | | |
| Biosensors | 2.00 | | | 2.00 | | | | | | | | | | | | | | | |
| COMPUTING SYSTEMS | | | | | | | | | | | | | | | | | | | |
| Expert Sys & Neural Net | 2.00 | | | | 2.00 | | | | | | | | | | | | | | |
| Optical Computing | 0.00 | | | | | | | | | | | | | | | | | | |
| BASIC ANALYTICAL RESEARCH | 2.00 | | 2.00 | | | | | | | | | | | | | | | | |
| Plant Tissue Culture | 2.00 | | | 2.00 | | | | | | | | | | | | | | | |
| Processing Plt Sup | 0.50 | | | 0.00 | | | | | | | 0.50 | | | | 0.00 | | 0.00 | | |
| Biochemical Processing | 0.00 | | | | | | | | | | | | | | 0.00 | | | | |
| Alpha | 0.00 | | | | | | | | | | | | | | | | | | |
| Primary Improv | 3.00 | | | | | | | | | | | | | | | | 3.00 | | |
| Recon Plt Sup | 1.90 | | | | | | | | | | | | | | | | 1.90 | | |
| Total Support | 143.60 | 29.00 | 1.00 | 0.00 | 28.00 | 2.70 | 0.00 | 0.00 | 11.00 | 17.90 | 0.00 | 0.00 | 0.00 | 0.00 | 11.00 | 0.00 | 0.00 | 0.00 | 43.00 |
| Total Direct | 445.40 | 0.00 | 60.00 | 51.00 | 5.00 | 27.30 | 13.00 | 31.00 | 26.00 | 8.10 | 25.00 | 28.00 | 51.00 | 8.00 | 0.00 | 15.00 | 38.00 | 59.00 | 0.00 |
| Total Direct & Support | 589.00 | 29.00 | 61.00 | 51.00 | 33.00 | 30.00 | 13.00 | 31.00 | 37.00 | 26.00 | 25.00 | 28.00 | 51.00 | 8.00 | 11.00 | 15.00 | 38.00 | 59.00 | 43.00 |
| | 589.00 | | | | | | | | | | | | | | | | | | |

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| DIRECT 1993 | TOTAL | ADMIN | ARD | BCR | CAD | CHM | CIGDEV | CIGTEC | CTSD | DEVENG | FLADEV | PED | PHY | STS-TA | TIS | TOBFUN | TOBMATL | TOBPF | EX/ADMIN |
|--------------------------------|-------|-------|------|-------|------|-------|--------|--------|-------|--------|--------|-------|-------|--------|-----|--------|---------|-------|----------|
| OPERATIONS SUPPORT | | | | | | | | | 0.00 | | | | | | | | | | |
| Adhesives | 4.60 | | 4.00 | | | | | | | | 0.20 | | | | | | | 0.40 | |
| Cigarette Monitoring | 1.20 | | | | | | | 0.50 | | | 0.10 | | | | | | | 0.10 | |
| Materials Evaluation | 4.70 | | 3.00 | | | | 0.05 | 0.25 | 0.00 | | | | | 0.20 | | | | 1.20 | |
| Customer Complaints-T/O/S | 1.90 | | 1.00 | | | | | 0.70 | | | | | | 0.10 | | | | 0.10 | |
| Flavor Dev/Analytical Sup | 2.45 | | | | | | | | | | 1.25 | | | 0.10 | | | | 1.10 | |
| Mariboro Standardization | 5.75 | | 1.00 | | | | | 0.25 | | 3.00 | 1.00 | | | | | | | 0.50 | |
| Alt Humectants/Preserv | 0.30 | | | 0.00 | | | | | | | 0.10 | | | | | | | 0.20 | |
| Micro Quality Improv | 7.10 | | | 7.00 | | | | | | | | | | | | | | 0.10 | |
| Monogram Inks | 0.00 | | | | | | | | | | | | | | | | | | |
| Packaging - Inks & Solvents | 3.85 | | 1.00 | | | | | 2.50 | | | 0.35 | | | | | | | | |
| Semiworks Support | 17.10 | | | | | | | | 2.00 | | 0.10 | | | | | | | 15.00 | |
| Burley Spray/Dry Flavors | 0.80 | | | | | | | | | | 0.50 | | | | | | | 0.30 | |
| Flavor Specs/Certs | 1.30 | | 0.50 | | | | | | | | 0.60 | | | | | | | | |
| ETS Studies | 1.60 | | 1.50 | | | | | | | | | | | 0.20 | | | | | |
| Entomological Support | 3.70 | | 0.50 | 3.20 | | | | | | | | | | 0.10 | | | | | |
| Project Warhol | 0.00 | | | 0.00 | | | | | | | | | | | | | | | |
| Engineering Stud/Methods | 3.20 | | 2.50 | | | | | | 0.50 | | 0.20 | | | | | | | | |
| Recon Sheet Certification | 0.00 | | | | | | | | | | 0.00 | | | | | | | | |
| Cooperative Leaf Studies | 2.00 | | 1.50 | | | | | 0.50 | | | | | | | | | | | |
| Environmental Issues | 16.65 | | | 1.50 | | | | 1.00 | 1.00 | | 0.50 | | 1.00 | 0.40 | | 2.00 | 2.00 | 0.75 | |
| PROJECT TOMORROW | 19.50 | | 2.00 | | 0.20 | | 0.35 | 3.00 | 1.50 | 0.50 | 1.00 | | 8.00 | 0.20 | | 2.00 | | 0.75 | |
| OPTICAL PROCESSING | 6.30 | | | | | | | | | | | | 6.00 | | | | | 0.30 | |
| NEW EXPANSION PROCESS | 20.00 | | 3.00 | | 0.20 | | | | | | 0.60 | | 5.00 | 1.00 | | 6.20 | 3.00 | 1.00 | |
| CAST LEAF RCB PROCESS | 19.45 | | 2.50 | | | | | | | 1.00 | 0.50 | | | 0.60 | | | 14.00 | 0.85 | |
| PROJECT ART | | | | | | | | | 0.00 | | | | | | | | | | |
| Art Sup of Current proc | 6.95 | | 0.00 | 0.00 | | 0.00 | 0.50 | 0.00 | 0.00 | | 0.25 | | | | | | 0.50 | 5.70 | |
| Art Process Development | 14.75 | | 2.50 | 0.50 | 0.20 | 1.05 | | | | | 0.50 | | | | | | 10.00 | | |
| Art Total | | | | | | | | | | | | | | | | | | | |
| PROJECT BETA | 36.05 | | 5.00 | 1.00 | 0.40 | 0.10 | | | | | 1.25 | | 25.00 | | | 3.30 | | | |
| PROJECT SIGMA | 0.70 | | | | | | | 0.00 | | | 0.00 | | | | | | | 0.70 | |
| TSNA | 13.70 | | 1.00 | 12.60 | | 0.10 | | | | | | | | | | | | | |
| LBA | 9.80 | | 0.50 | 9.00 | | 0.10 | | | | | | | | 0.20 | | | | | |
| REDUCED SS/PAPER TECH | 37.45 | | 5.50 | 4.00 | 0.20 | 12.00 | 0.25 | 12.75 | | | 0.25 | | | 0.50 | | | | 2.00 | |
| PROJECT AMBROSIA/ASH TRAY ODOR | 7.45 | | 2.50 | 0.00 | | 2.10 | 0.75 | 1.00 | | | 0.50 | | | 0.20 | | | | 0.40 | |
| PROJECT PACT | 0.40 | | | | | | | | | | | | | 0.40 | | | 0.00 | | |
| LOW TAR/HIGH FLAVOR | 10.10 | | 1.50 | 0.50 | | 0.95 | 1.00 | 1.00 | 0.00 | | 3.25 | | | | | | | 1.90 | |
| FILTER RESEARCH | 0.00 | | | | | | | | | | | | | | | | | 0.00 | |
| Domestic | 7.30 | | 0.50 | | 0.20 | 1.10 | | 3.00 | 0.50 | | 0.30 | | 1.00 | | | | | 0.70 | |
| International | 1.50 | | | | | | | 1.50 | | | 0.00 | | | | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | 67.35 | | 1.00 | | 0.30 | | 5.50 | 2.00 | 14.00 | | 5.05 | 25.30 | | 0.90 | | 1.50 | 1.00 | 10.80 | |
| INTERNATIONAL PRODUCT SUPPORT | 0.00 | | | | | | | | | | | | | | | | 0.00 | 0.00 | |
| PM USA | 22.05 | | 1.50 | | 0.30 | 0.20 | | 1.75 | 2.00 | | 3.00 | 1.00 | | | | | 0.50 | 11.80 | |
| PM PI | 41.00 | | | | | | 15.00 | | 22.00 | | 2.00 | 2.00 | | | | | | | |
| PROJECT NATURAL | 0.70 | | | | | | | | | | 0.00 | | | | | | | 0.70 | |
| INGREDIENTS | 3.10 | | | 0.70 | | | | | | | | | | | | | | | |
| MENTHOL | 5.55 | | | | | 0.90 | 1.00 | 0.30 | 0.50 | | 2.35 | | | | | | 0.50 | | |
| REDUCED TAR & NICOTINE INTL | 1.80 | | | | | | | 0.50 | 0.50 | | 0.20 | | | | | | | 0.60 | |
| SELECTIVE FILTRATION | 4.75 | | 1.00 | | | 1.00 | | | | | | | 2.00 | | | | | | |
| NEW PACKAGING CONCEPTS | 0.20 | | | | | | | | | | | | | | | | | | |
| PROCESS DEV STUDIES | 2.25 | | | | | | | 1.10 | | | | | | | | 0.00 | | 1.15 | |
| COMBUSTION RESEARCH | | | 0.00 | | | | | | | | | | | | | | | | |
| Mass Burn Control | 1.10 | | | | | | | 0.10 | | | | | 1.00 | | | | | | |
| Pyrolysis Temp Control | 2.00 | | 1.00 | | | | | 1.00 | | | | | | | | | | | |
| FLAVORS | | | | | | | | | | | | | | | | | | | |
| Thermal Flavor Release | 3.85 | | 1.00 | | | 1.60 | | 0.25 | | | 1.00 | | | | | | | | |
| Flavor Formation Studies | 1.20 | | | | | 0.20 | | | | | 1.00 | | | | | | | | |
| Fragrances | 0.25 | | | | | 0.20 | | | | | 0.05 | | | | | | | | |
| Volatile Flavors | 0.85 | | | | | 0.40 | | | | | 0.45 | | | | | | | | |
| AEROSOLS | | | | | | | | | | | | | | | | | | | |
| Formation Mechanisms | 4.55 | | | | 1.00 | 1.35 | | 0.20 | | | | | 2.00 | | | | | | |
| Short Lived Aerosols | 1.00 | | | | | | | | | | | | 1.00 | | | | | | |
| SELECTIVE SEPARATIONS | | | | | | | | | | | | | | | | | | | |
| Supercritical Technology | 4.50 | | 3.00 | 0.00 | | | | | | | | | | | | | 1.50 | | |

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| DIRECT 1993 | TOTAL | ADMIN | ARD | BCR | CAD | CHM | CIGDEV | CIGTEC | CTSD | DEVENG | FLADEV | RED | PHY | STS-TA | TIS | TOBFUN | TOBMATL | TOBPF | EX/ADMIN |
|-------------------------------|--------|-------|-------|-------|-------|-------|--------|--------|-------|--------|--------|-------|-------|--------|-------|--------|---------|-------|----------|
| Membrane Separation | 0.45 | | | | | 0.45 | | | | | | | | | | | | | |
| CONSUMER TESTING RESEARCH | | | | | | | | | | | | | | | | | | | |
| Regression Based Mod of Lik | 1.50 | | | | | | | | | | | 1.50 | | | | | | | |
| Stochastic Discrimination Mo | 0.50 | | | | | | | | | | | 0.50 | | | | | | | |
| Cost/Benefit Eval | 0.50 | | | | | | | | | | | 0.50 | | | | | | | |
| Quant Mod of Market Dynamics | 0.20 | | | | | | | | | | | 0.20 | | | | | | | |
| CHEMICAL SENSES | | | | | | | | | | | | | | | | | | | |
| Electrophysiological Stud | 1.00 | | | 1.00 | | 0.00 | | | | | | | | | | | | | |
| Trigeminal Stud | 1.00 | | | 1.00 | | | | | | | | | | | | | | | |
| Odor Panel | 0.40 | | | | | 0.40 | | | | | | | | | | | | | |
| Room Odor Panel | 0.00 | | | | | | | | | | | | | | | | | | |
| Flav Response/ Chm Aspects | 3.50 | | 2.00 | 1.00 | | | | | | | | | | 0.50 | | | | | |
| Struct-Act Relationships | 1.00 | | | 1.00 | | | | | | | | | | | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | | | | | | | | | | | | | | | |
| Process Control Sys | 1.00 | | 1.00 | | | | | | | | | | | | | | | | |
| BIOLOGICAL | | | | | | | | | | | | | | | | | | | |
| Bioconversion | 2.05 | | 1.00 | 1.00 | | 0.05 | | | | | | | | | | | | | |
| Antibodies | 1.05 | | | 1.00 | | 0.05 | | | | | | | | | | | | | |
| Biosensors | 3.00 | | | 3.00 | | | | | | | | | | | | | | | |
| COMPUTING SYSTEMS | | | | | | | | | | | | | | | | | | | |
| Expert Sys & Neural Net | 2.00 | | | | 2.00 | | | | | | | | | | | | | | |
| Optical Computing | 0.00 | | | | | | | | | | | | | | | | | | |
| BASIC ANALYTICAL RESEARCH | 2.00 | | 2.00 | | | | | | | | | | | | | | | | |
| Plant Tissue Culture | 2.00 | | | 2.00 | | | | | | | | | | | | | | | |
| Processing Plt Sup | 0.50 | | | 0.00 | | | | | | | 0.50 | | | | 0.00 | | 0.00 | | |
| Biochemical Processing | 1.00 | | | 1.00 | | | | | | | | | | | 0.00 | | | | |
| Alpha | 0.00 | | | | | | | | | | | | | | | | | | |
| Primary Improv | 2.00 | | | | | | | | | | | | | | | | | | |
| Recon Plt Sup | 3.00 | | | | | | | | | | | | | | | | | | |
| Total Support | 151.70 | 29.00 | 1.00 | 0.00 | 28.00 | 2.70 | 0.00 | 0.00 | 11.00 | 26.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11.00 | 0.00 | 0.00 | 0.00 | 43.00 |
| Total Direct | 446.30 | 0.00 | 63.00 | 52.00 | 5.00 | 27.30 | 14.00 | 31.00 | 26.00 | 0.00 | 27.00 | 29.00 | 52.00 | 8.00 | 0.00 | 15.00 | 38.00 | 59.00 | 0.00 |
| Total Direct & Support | 598.00 | 29.00 | 64.00 | 52.00 | 33.00 | 30.00 | 14.00 | 31.00 | 37.00 | 26.00 | 27.00 | 29.00 | 52.00 | 8.00 | 11.00 | 15.00 | 38.00 | 59.00 | 43.00 |
| | 598.00 | | | | | | | | | | | | | | | | | | |
| | 446.30 | | | | | | | | | | | | | | | | | | |

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| DIRECT 1994 | TOTAL | ADMIN | ARD | BGR | CAD | CHM | CIGDEV | CIGTEC | CTSD | DEVENG | FLADEV | PED | PHY | STS-TA | TIS | TOBFUN | TOBMATL | TOBPF | EX/ADMIN |
|--------------------------------|-------|-------|------|-------|------|-------|--------|--------|-------|--------|--------|-------|-------|--------|-----|--------|---------|-------|----------|
| OPERATIONS SUPPORT | | | | | | | | | 0.00 | | | | | | | | | | |
| Adhesives | 3.60 | | 3.00 | | | | | | | | 0.20 | | | | | | | | 0.40 |
| Cigarette Monitoring | 1.20 | | | | | | | | 0.50 | | 0.10 | | | | | | | | 0.10 |
| Materials Evaluation | 4.70 | | 3.00 | | | 0.05 | 0.25 | 0.00 | | | | | | 0.20 | | | | | 1.20 |
| Customer Complaints-T/O/S | 2.00 | | 1.00 | | | | | 0.70 | | | | | | 0.20 | | | | | 0.10 |
| Flavor Dev/Analytical Sup | 2.65 | | | | | | | | | | 1.45 | | | 0.10 | | | | | 1.10 |
| Marlboro Standardization | 5.75 | | 1.00 | | | | 0.25 | | 3.00 | | 1.00 | | | | | | | | 0.50 |
| Alt Humectants/Preserv | 0.30 | | | 0.00 | | | | | | | 0.10 | | | | | | | | 0.20 |
| Micro Quality Improv | 7.10 | | | 7.00 | | | | | | | | | | | | | | | 0.10 |
| Monogram Inks | 0.00 | | | | | | | | | | | | | | | | | | |
| Packaging - Inks & Solvents | 3.85 | | 1.00 | | | | | 2.50 | | | 0.35 | | | | | | | | |
| Semiworks Support | 17.10 | | | | | | | | 2.00 | | 0.10 | | | | | | | | 15.00 |
| Burley Spray/Dry Flavors | 0.80 | | | | | | | | | | 0.50 | | | | | | | | 0.30 |
| Flavor Specs/Certs | 1.30 | | 0.50 | | | | | | | | 0.60 | | | | | | | | |
| ETS Studies | 1.60 | | 1.50 | | | | | | | | | | | 0.20 | | | | | |
| Entomological Support | 3.70 | | 0.50 | 3.20 | | | | | | | | | | 0.10 | | | | | |
| Project Warhol | 0.00 | | | 0.00 | | | | | | | | | | | | | | | |
| Engineering Stud/Methods | 4.00 | | 2.50 | | | | | | 0.50 | | 1.00 | | | | | | | | |
| Recon Sheet Certification | 0.00 | | | | | | | | | | 0.00 | | | | | | | | |
| Cooperative Leaf Studies | 2.00 | | 1.50 | | | 0.50 | | | | | | | | | | | | | |
| Environmental Issues | 20.45 | | 6.00 | 2.20 | | 2.00 | 1.00 | | 1.00 | | 0.50 | | 2.00 | 0.50 | | 2.50 | 2.00 | | 0.75 |
| PROJECT TOMORROW | 21.80 | | 3.00 | | 0.20 | 0.35 | 3.50 | 1.50 | 0.50 | | 0.50 | | 8.00 | | | 3.50 | | | 0.75 |
| OPTICAL PROCESSING | 7.30 | | | | | | | | | | | | 7.00 | | | | | | 0.30 |
| NEW EXPANSION PROCESS | 13.70 | | 2.50 | | 0.20 | | | | | | 0.60 | | 3.00 | 1.20 | | 4.20 | 1.00 | | 1.00 |
| CAST LEAF RCB PROCESS | 16.45 | | 2.50 | | | | | | 1.00 | | 0.10 | | | 0.80 | | | 11.20 | | 0.85 |
| PROJECT ART | | | | | | | | | 0.00 | | | | | | | | | | |
| Art Sup of Current proc | 6.30 | | 0.00 | 0.00 | | 0.00 | 0.50 | 0.00 | | | 0.10 | | | | | | 0.00 | | 5.70 |
| Art Process Development | 12.35 | | 2.00 | 0.00 | 0.20 | 1.05 | | | | | 0.10 | | | | | | 9.00 | | |
| Art Total | | | | | | | | | | | | | | | | | | | |
| PROJECT BETA | 37.05 | | 6.00 | 1.00 | 0.40 | 0.10 | | | | | 1.25 | | 25.00 | | | 3.30 | | | |
| PROJECT SIGMA | 0.70 | | | | | | | 0.00 | | | 0.00 | | | | | | | | 0.70 |
| TSNA | 12.00 | | 0.50 | 10.40 | | 0.10 | | | | | | | 1.00 | | | | | | |
| LBA | 12.80 | | 0.50 | 12.00 | | 0.10 | | | | | | | | 0.20 | | | | | |
| REDUCED SS/PAPER TECH | 35.70 | | 5.50 | 3.00 | 0.20 | 11.00 | 0.50 | 12.75 | | | 0.25 | | | 0.50 | | | | | 2.00 |
| PROJECT AMBROSIA/ASH TRAY ODOR | 4.50 | | 1.00 | 0.00 | | 1.10 | 0.50 | 1.00 | | | 0.50 | | | 0.00 | | | | | 0.40 |
| PROJECT PACT | 0.20 | | | | | | | | | | | | | 0.20 | | | 0.00 | | |
| LOW TAR/HIGH FLAVOR | 9.85 | | 1.50 | 0.50 | | 0.95 | 1.00 | 1.00 | 0.00 | | 3.00 | | | | | | | | 1.90 |
| FILTER RESEARCH | 0.00 | | | | | | | | | | | | | | | | | | 0.00 |
| Domestic | 7.30 | | 0.50 | | 0.20 | 1.10 | | 3.00 | 0.50 | | 0.30 | | 1.00 | | | | | | 0.70 |
| International | 1.50 | | | | | | | 1.50 | | | 0.00 | | | | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | 67.45 | | 1.00 | | 0.30 | | 5.50 | 2.00 | 14.00 | | 5.05 | 25.30 | | 1.00 | | 1.50 | 1.00 | 10.80 | |
| INTERNATIONAL PRODUCT SUPPORT | 0.00 | | | | | | | | | | | | | | | | 0.00 | | 0.00 |
| PM USA | 23.30 | | 1.50 | | 0.30 | 0.20 | | 1.75 | 2.00 | | 4.25 | 1.00 | | | | | 0.50 | 11.80 | |
| PM PI | 41.00 | | | | | | 15.00 | | 22.00 | | 2.00 | 2.00 | | | | | | | |
| PROJECT NATURAL | 0.70 | | | | | | | | | | 0.00 | | | | | | | | 0.70 |
| INGREDIENTS | 3.10 | | | 0.70 | | | | | | | | | | | | | | | |
| MENTHOL | 5.20 | | | | | 0.90 | 0.50 | 0.30 | 0.50 | | 2.50 | | | 2.40 | | | 0.50 | | |
| REDUCED TAR & NICOTINE INTL | 1.60 | | | | | | | 0.75 | 0.50 | | 0.00 | | | | | | | | 0.60 |
| SELECTIVE FILTRATION | 4.75 | | 1.00 | | | 1.00 | | | | | | | 2.00 | | | | | | |
| NEW PACKAGING CONCEPTS | 0.20 | | | | | | | 0.20 | | | | | | | | | | | |
| PROCESS DEV STUDIES | 2.25 | | | | | | | 1.10 | | | | | | | | 0.00 | | | 1.15 |
| COMBUSTION RESEARCH | | | 0.00 | | | | | | | | | | | | | | | | |
| Mass Burn Control | 1.10 | | | | | 0.10 | | | | | | | 1.00 | | | | | | |
| Pyrolysis Temp Control | 2.00 | | 1.00 | | | 1.00 | | | | | | | | | | | | | |
| FLAVORS | | | | | | | | | | | | | | | | | | | |
| Thermal Flavor Release | 3.95 | | 1.00 | | | | | 0.25 | | | 1.10 | | | | | | | | |
| Flavor Formation Studies | 1.30 | | | | | | | 0.20 | | | 1.10 | | | | | | | | |
| Fragrances | 0.25 | | | | | | | 0.20 | | | 0.05 | | | | | | | | |
| Volatile Flavors | 1.15 | | | | | | | 0.40 | | | 0.75 | | | | | | | | |
| AEROSOLS | | | | | | | | | | | | | | | | | | | |
| Formation Mechanisms | 3.55 | | | | 1.00 | 1.35 | | 0.20 | | | | | 1.00 | | | | | | |
| Short Lived Aerosols | 2.00 | | | | | | | | | | | | 2.00 | | | | | | |
| SELECTIVE SEPARATIONS | | | | | | | | | | | | | | | | | | | |
| Supercritical Technology | 8.00 | | 3.00 | 0.00 | | | | | | | | | | | | | 5.00 | | |

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| DIRECT 1994 | TOTAL | ADMIN | ARD | BCR | CAD | CHM | GIGDEV | GIGTEC | CTSD | DEVENG | FLADEV | PED | PHY | STS-TA | TIS | TOBFUN | TOBMATL | TOBPF | EX/ADMIN |
|-------------------------------|--------|-------|-------|-------|-------|-------|--------|--------|-------|--------|--------|-------|-------|--------|-------|--------|---------|-------|----------|
| Membrane Separation | 1.45 | | | | | 0.45 | | | | | | | | | | | 1.00 | | |
| CONSUMER TESTING RESEARCH | | | | | | | | | | | | | | | | | | | |
| Regression Based Mod of Lix | 1.50 | | | | | | | | | | | 1.50 | | | | | | | |
| Stochastic Discrimination Mo | 0.50 | | | | | | | | | | | 0.50 | | | | | | | |
| Cost/Benefit Eval | 0.50 | | | | | | | | | | | 0.50 | | | | | | | |
| Quant Mod of Market Dynamics | 0.20 | | | | | | | | | | | 0.20 | | | | | | | |
| CHEMICAL SENSES | | | | | | | | | | | | | | | | | | | |
| Electrophysiological Stud | 1.00 | | | 1.00 | | 0.00 | | | | | | | | | | | | | |
| Trigeminal Stud | 1.00 | | | 1.00 | | | | | | | | | | | | | | | |
| Odor Panel | 0.40 | | | | | 0.40 | | | | | | | | | | | | | |
| Room Odor Panel | 0.00 | | | | | | | | | | | | | | | | | | |
| Flav Response/ Chm Aspects | 4.90 | | 2.50 | 1.00 | | 1.00 | | | | | | | | 0.40 | | | | | |
| Struct-Act Relationships | 2.00 | | | 1.00 | | 1.00 | | | | | | | | | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | | | | | | | | | | | | | | | |
| Process Control Sys | 1.00 | | 1.00 | | | | | | | | | | | | | | | | |
| BIOLOGICAL | | | | | | | | | | | | | | | | | | | |
| Bioconversion | 2.05 | | 1.00 | 1.00 | | 0.05 | | | | | | | | | | | | | |
| Antibodies | 1.05 | | | 1.00 | | 0.05 | | | | | | | | | | | | | |
| Biosensors | 3.50 | | 0.50 | 3.00 | | | | | | | | | | | | | | | |
| COMPUTING SYSTEMS | | | | | | | | | | | | | | | | | | | |
| Expert Sys & Neural Net | 2.00 | | | | 2.00 | | | | | | | | | | | | | | |
| Optical Computing | 0.00 | | | | | | | | | | | | | | | | | | |
| BASIC ANALYTICAL RESEARCH | 2.50 | | 2.50 | | | | | | | | | | | | | | | | |
| Plant Tissue Culture | 2.00 | | | | | | | | | | | | | | | | | | |
| Processing Plant Sup | 0.50 | | | 2.00 | | | | | | | | | | | | | | | |
| Biochemical Processing | 2.00 | | | 2.00 | | | | | | | 0.50 | | | | 0.00 | | 0.00 | | |
| Alpha | 0.00 | | | | | | | | | | | | | | 0.00 | | | | |
| Primary Improvement | 2.30 | | | | | | | | | | | | | | | | | | |
| Recon Plant Sup | 4.50 | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 2.30 | | |
| | | | | | | | | | | | | | | | | | 4.50 | | |
| Total Support | 151.70 | 29.00 | 1.00 | 0.00 | 28.00 | 2.70 | 0.00 | 0.00 | 11.00 | 26.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11.00 | 0.00 | 0.00 | 0.00 | 43.00 |
| Total Direct | 450.30 | 0.00 | 63.00 | 53.00 | 5.00 | 28.30 | 14.00 | 31.00 | 26.00 | 0.00 | 28.00 | 29.00 | 53.00 | 8.00 | 0.00 | 15.00 | 38.00 | 59.00 | 0.00 |
| Total Direct & Support | 602.00 | 29.00 | 64.00 | 53.00 | 33.00 | 31.00 | 14.00 | 31.00 | 37.00 | 26.00 | 28.00 | 29.00 | 53.00 | 8.00 | 11.00 | 15.00 | 38.00 | 59.00 | 43.00 |
| | 602.00 | | | | | | | | | | | | | | | | | | |
| | 450.30 | | | | | | | | | | | | | | | | | | |

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| DIRECT 1995 | TOTAL | ADMIN | ARD | BCR | CAD | CHM | CIGDEV | CIGTEC | CTSD | DEVENG | FLADEV | PED | PHY | STS-TA | TIS | TOBEUN | TOBMATL | TOBPF | EX/ADMIN |
|--------------------------------|-------|-------|------|-------|------|-------|--------|--------|-------|--------|--------|-------|-------|--------|------|--------|---------|-------|----------|
| OPERATIONS SUPPORT | | | | | | | | | 0.00 | | | | | | | | | | |
| Adhesives | 3.60 | | 3.00 | | | | | | | | 0.20 | | | | | | | 0.40 | |
| Cigarette Monitoring | 1.20 | | | | | | | | 0.50 | | 0.10 | | | | | | | 0.10 | |
| Materials Evaluation | 4.70 | | 3.00 | | | 0.05 | 0.25 | 0.00 | | | | | | 0.20 | | | | 1.20 | |
| Customer Complaints-T/O/S | 2.00 | | 1.00 | | | | | 0.70 | | | 0.10 | | | 0.20 | | | | | |
| Flavor Dev/Analytical Sup | 2.65 | | | | | | | | | | 1.45 | | | 0.10 | | | | 1.10 | |
| Marlboro Standardization | 5.75 | | 1.00 | | | | 0.25 | | 3.00 | | 1.00 | | | | | | | 0.50 | |
| Alt Humectants/Preserv | 0.30 | | | 0.00 | | | | | | | 0.10 | | | | | | | 0.20 | |
| Micro Quality Improv | 7.10 | | | 7.00 | | | | | | | | | | | | | | 0.10 | |
| Monogram Inks | 0.00 | | | | | | | | | | | | | | | | | | |
| Packaging - Inks & Solvents | 4.85 | | 2.00 | | | | | 2.50 | | | 0.35 | | | | | | | | |
| Semiworks Support | 17.10 | | | | | | | | 2.00 | | 0.10 | | | | | | | 15.00 | |
| Burley Spray/Dry Flavors | 0.80 | | | | | | | | | | 0.50 | | | | | | | 0.30 | |
| Flavor Specs/Certs | 1.30 | | 0.50 | | | | | | | | 0.60 | | | 0.20 | | | | | |
| ETS Studies | 1.60 | | 1.50 | | | | | | | | | | | 0.10 | | | | | |
| Entomological Support | 3.70 | | 0.50 | 3.20 | | | | | | | | | | | | | | | |
| Project Warhol | 0.00 | | | 0.00 | | | | | | | | | | | | | | | |
| Engineering Stud/Methods | 4.00 | | 2.50 | | | | | | 0.50 | | 1.00 | | | | | | | | |
| Recon Sheet Certification | 0.00 | | | | | | | | | | 0.00 | | | | | | | | |
| Cooperative Leaf Studies | 2.00 | | 1.50 | | | 0.50 | | | | | | | | | | | | | |
| Environmental Issues | 23.95 | | 7.50 | 2.20 | | 3.00 | 1.00 | | 1.00 | | 0.50 | | 3.00 | 0.50 | | 2.50 | 2.00 | 0.75 | |
| PROJECT TOMORROW | 15.80 | | 1.00 | | 0.20 | 0.35 | 2.00 | 1.50 | 0.50 | | 0.00 | | 6.00 | | | 3.50 | | 0.75 | |
| OPTICAL PROCESSING | 7.30 | | | | | | | | | | | | 7.00 | | | | | 0.30 | |
| NEW EXPANSION PROCESS | 12.20 | | 2.00 | | 0.20 | | | | | | 0.60 | | 3.00 | 1.20 | | 4.20 | 0.00 | 1.00 | |
| CASL LEAF RCB PROCESS | 15.65 | | 2.50 | | | | | | 1.00 | | 0.00 | | | 0.80 | | | 10.50 | 0.85 | |
| PROJECT ART | | | | | | | | | 0.00 | | | | | | | | | | |
| Art Sup of Current proc | 6.30 | | 0.00 | 0.00 | | 0.00 | 0.50 | 0.00 | 0.00 | | 0.10 | | | | | | 0.00 | 5.70 | |
| Art Process Development | 6.35 | | 1.00 | 0.00 | 0.20 | 1.05 | | | | | 0.10 | | | | | | 4.00 | | |
| Art Total | | | | | | | | | | | | | | | | | | | |
| PROJECT BETA | 32.05 | | 6.00 | 1.00 | 0.40 | 0.10 | | | | | 1.25 | | 20.00 | | | 3.30 | | | |
| PROJECT SIGMA | 0.70 | | | | | | | 0.00 | | | 0.00 | | | | | | | 0.70 | |
| TSNA | 12.50 | | | 11.40 | | 0.10 | | | | | | | 1.00 | | | | | | |
| IBA | 12.80 | | 0.50 | 12.00 | | 0.10 | | | | | | | | 0.20 | | | | 1.00 | |
| REDUCED SS/PAPER TECH | 33.50 | | 5.50 | 3.00 | 0.20 | 10.00 | 0.50 | 12.75 | | | 0.25 | | | 0.30 | | | | 0.40 | |
| PROJECT AMBROSIA/ASH TRAY ODOR | 2.15 | | 0.00 | 0.00 | | 0.00 | 0.50 | 1.00 | | | 0.25 | | | | | | | | |
| PROJECT PACT | 0.00 | | | | | | | | | | | | | | | | 0.00 | | |
| LOW TAR/HIGH FLAVOR | 9.85 | | 1.50 | 0.50 | | 0.95 | 1.00 | 1.00 | 0.00 | | 3.00 | | | | | | | 1.90 | |
| FILTER RESEARCH | 0.00 | | | | | | | | | | | | | | | | | 0.00 | |
| Domestic | 7.30 | | 0.50 | | 0.20 | 1.10 | | 3.00 | 0.50 | | 0.30 | | 1.00 | | | | | 0.70 | |
| International | 1.50 | | | | | | | 1.50 | | | 0.00 | | | | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | 70.95 | | 1.00 | | 0.30 | | 8.00 | 2.00 | 14.00 | | 5.05 | 26.30 | | 1.00 | | 1.50 | 1.00 | 10.80 | |
| INTERNATIONAL PRODUCT SUPPORT | | | | | | | | | | | | | | | | | 0.00 | 0.00 | |
| PM USA | 25.05 | | 1.50 | | 0.30 | 0.20 | | 1.75 | 2.00 | | 5.00 | 1.00 | | | | | 0.50 | 12.80 | |
| PM PI | 41.00 | | | | | | 15.00 | | 22.00 | | 2.00 | 2.00 | | | | | | | |
| PROJECT NATURAL | 0.70 | | | | | | | | | | 0.00 | | | | | | | 0.70 | |
| INGREDIENTS | 3.10 | | | 0.70 | | | | | | | | | | | 2.40 | | | | |
| MENTHOL | 5.70 | | | | | 0.90 | 0.50 | 0.30 | 0.50 | | 3.00 | | | | | 0.50 | | | |
| REDUCED TAR & NICOTINE INTL | 1.60 | | | | | | | 0.50 | 0.50 | | 0.00 | | | | | | | 0.60 | |
| SELECTIVE FILTRATION | 6.75 | | 1.00 | | | 2.00 | | 0.75 | | | | | 3.00 | | | | | | |
| NEW PACKAGING CONCEPTS | 0.20 | | | | | | | 0.20 | | | | | | | | | | | |
| PROCESS DEV STUDIES | 2.25 | | | | | | | 1.10 | | | | | | | | 0.00 | | 1.15 | |
| COMBUSTION RESEARCH | | | 0.00 | | | | | | | | | | | | | | | | |
| Mass Burn Control | 0.10 | | | | | 0.10 | | | | | | | | | | | | | |
| Pyrolysis Temp Control | 2.10 | | 1.00 | | | 1.10 | | | | | | | | | | | | | |
| FLAVORS | | | | | | | | | | | | | | | | | | | |
| Thermal Flavor Release | 4.20 | | 1.00 | | | | | 0.25 | | | 1.35 | | | | | | | | |
| Flavor Formation Studies | 1.55 | | | | | 0.20 | | | | | 1.35 | | | | | | | | |
| Fragrances | 0.25 | | | | | 0.20 | | | | | 0.05 | | | | | | | | |
| Volatile Flavors | 1.15 | | | | | 0.40 | | | | | 0.75 | | | | | | | | |
| AEROSOLS | | | | | | | | | | | | | | | | | | | |
| Formation Mechanisms | 3.55 | | | | 1.00 | 1.35 | | 0.20 | | | | | 1.00 | | | | | | |
| Short Lived Aerosols | 3.00 | | | | | | | | | | | | 3.00 | | | | | | |
| SELECTIVE SEPARATIONS | | | | | | | | | | | | | | | | | | | |
| Supercritical Technology | 12.00 | | 4.00 | 0.00 | | | | | | | | | | | | | 8.00 | | |

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| | TOTAL | ADMIN | ARD | BCR | CAD | CHM | CIGDEV | CIGTEC | CTSD | DEVENG | FLADEV | PED | PHY | STS-TA | TIS | TOBFUN | TOBMATL | TOBPF | EX/ADMIN |
|-------------------------------|--------|-------|-------|-------|-------|-------|--------|--------|-------|--------|--------|-------|-------|--------|-------|--------|---------|-------|----------|
| DIRECT 1995 | | | | | | | | | | | | | | | | | | | |
| Membrane Separation | 4.45 | | | | | 0.45 | | | | | | | | | | | 4.00 | | |
| CONSUMER TESTING RESEARCH | | | | | | | | | | | | | | | | | | | |
| Regression Based Mod of Lik | 1.50 | | | | | | | | | | | 1.50 | | | | | | | |
| Stochastic Discrimination Mo | 0.50 | | | | | | | | | | | 0.50 | | | | | | | |
| Cost/Benefit Eval | 0.50 | | | | | | | | | | | 0.50 | | | | | | | |
| Quant Mod of Market Dynamics | 0.20 | | | | | | | | | | | 0.20 | | | | | | | |
| CHEMICAL SENSES | | | | | | | | | | | | | | | | | | | |
| Electrophysiological Stud | 1.00 | | | 1.00 | | 0.00 | | | | | | | | | | | | | |
| Trigeminal Stud | 1.00 | | | 1.00 | | | | | | | | | | | | | | | |
| Odor Panel | 0.40 | | | | | 0.40 | | | | | | | | | | | | | |
| Room Odor Panel | 0.00 | | | | | | | | | | | | | | | | | | |
| Flav Response/ Chm Aspects | 5.80 | | 3.00 | 1.00 | | 1.00 | | | | | | | | 0.80 | | | | | |
| Struct-Act Relationships | 2.00 | | | 1.00 | | 1.00 | | | | | | | | | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | | | | | | | | | | | | | | | |
| Process Control Sys | 1.00 | | 1.00 | | | | | | | | | | | | | | | | |
| BIOLOGICAL | | | | | | | | | | | | | | | | | | | |
| Bioconversion | 2.05 | | 1.00 | 1.00 | | 0.05 | | | | | | | | | | | | | |
| Antibodies | 1.05 | | | 1.00 | | 0.05 | | | | | | | | | | | | | |
| Biosensors | 4.00 | | 1.00 | 3.00 | | | | | | | | | | | | | | | |
| COMPUTING SYSTEMS | 0.00 | | | | | | | | | | | | | | | | | | |
| Expert Sys & Neural Net | 2.00 | | | | 2.00 | | | | | | | | | | | | | | |
| Optical Computing | 0.00 | | | | | | | | | | | | | | | | | | |
| BASIC ANALYTICAL RESEARCH | 3.00 | | 3.00 | | | | | | | | | | | | | | | | |
| Plant Tissue Culture | 2.00 | | | 2.00 | | | | | | | 0.60 | | | | 0.00 | | 0.00 | | |
| Processing Plant Sup | 0.60 | | | 0.00 | | | | | | | | | | | 0.00 | | | | |
| Biochemical Processing | 2.00 | | | 2.00 | | | | | | | | | 5.00 | | | | | | |
| Alpha | 5.00 | | | | | | | | | | | | | | | | | | |
| Primary Improvement | 3.00 | | | | | | | | | | | | | | | | | | |
| Recon Plant Sup | 4.50 | | | | | | | | | | | | | | | | | | |
| Total Support | 151.70 | 29.00 | 1.00 | 0.00 | 28.00 | 2.70 | 0.00 | 0.00 | 11.00 | 26.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11.00 | 0.00 | 0.00 | 0.00 | 43.00 |
| Total Direct | 454.30 | 0.00 | 63.00 | 54.00 | 5.00 | 28.30 | 15.00 | 31.00 | 26.00 | 0.00 | 29.00 | 30.00 | 53.00 | 8.00 | 0.00 | 15.00 | 38.00 | 59.00 | 0.00 |
| Total Direct & Support | 606.00 | 29.00 | 64.00 | 54.00 | 33.00 | 31.00 | 15.00 | 31.00 | 37.00 | 26.00 | 29.00 | 30.00 | 53.00 | 8.00 | 11.00 | 15.00 | 38.00 | 59.00 | 43.00 |
| | 606.00 | | | | | | | | | | | | | | | | | | |
| | 454.30 | | | | | | | | | | | | | | | | | | |

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APPENDIX O

Resource Allocations

By Division

2026230655

| | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------------------------|-------|-------|-------|-------|-------|
| ADMIN9195R.W20 | | | | | |
| OPERATIONS SUPPORT | | | | | |
| Adhesives | | | | | |
| Cigarette Monitoring | | | | | |
| Materials Evaluation | | | | | |
| Customer Complaints-T/O/S | | | | | |
| Flavor Dev/Analytical Sup | | | | | |
| Marlboro Standardization | | | | | |
| Alt Humectants/Preserv | | | | | |
| Micro Quality Improv | | | | | |
| Monogram Inks | | | | | |
| Packaging - Inks & Solvents | | | | | |
| Semiworks Support | | | | | |
| Burley Spray/Dry Flavors | | | | | |
| Flavor Specs/Certs | | | | | |
| ETS Studies | | | | | |
| Entomological Support | | | | | |
| Project Warhol | | | | | |
| Engineering Stud/Methods | | | | | |
| Recon Sheet Certification | | | | | |
| Cooperative Leaf Studies | | | | | |
| Environmental Issues | | | | | |
| PROJECT TOMORROW | | | | | |
| OPTICAL PROCESSING | | | | | |
| NEW EXPANSION PROCESS | | | | | |
| CAST LEAF RCB PROCESS | | | | | |
| PROJECT ART | | | | | |
| Art Sup of Current proc | | | | | |
| Art Process Development | | | | | |
| Art Total | | | | | |
| PROJECT BETA | | | | | |
| PROJECT SIGMA | | | | | |
| TSNA | | | | | |
| LBA | | | | | |
| REDUCED SS/PAPER TECH | | | | | |
| PROJECT AMBROSIA/ASH TRAY ODOR | | | | | |
| PROJECT PACT | | | | | |
| LOW TAR/HIGH FLAVOR | | | | | |
| FILTER RESEARCH | | | | | |
| Domestic | | | | | |
| International | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | | | | | |
| INTERNATIONAL PRODUCT SUPPORT | | | | | |
| PM:USA | | | | | |
| PM:PI | | | | | |
| PROJECT NATURAL | | | | | |
| INGREDIENTS | | | | | |
| MENTHOL | | | | | |
| REDUCED TAR & NICOTINE INTL | | | | | |
| SELECTIVE FILTRATION | | | | | |
| NEW PACKAGING CONCEPTS | | | | | |
| PROCESS DEV STUDIES | | | | | |
| COMBUSTION RESEARCH | | | | | |
| Mass Burn Control | | | | | |
| Pyrolysis Temp Control | | | | | |
| FLAVORS | | | | | |
| Thermal Flavor Release | | | | | |
| Flavor Formation Studies | | | | | |
| Fragrances | | | | | |
| Volatile Flavors | | | | | |
| AEROSOLS | | | | | |
| Formation Mechanisms | | | | | |
| Short Lived Aerosols | | | | | |
| SELECTIVE SEPARATIONS | | | | | |
| Supercritical Technology | | | | | |
| Membrane Separation | | | | | |
| CONSUMER TESTING RESEARCH | | | | | |
| Regression Based Mod of Lik | | | | | |
| Stochastic Discrimination Mod | | | | | |
| Cost/Benefit Eval | | | | | |
| Quant Mod of Market Dynamics | | | | | |
| CHEMICAL SENSES | | | | | |
| Electrophysiological Stud | | | | | |
| Trigeminal Stud | | | | | |
| Odor Panel | | | | | |
| Room Odor Panel | | | | | |
| Flav Response/ Chm Aspects | | | | | |
| Struct-Act Relationships | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | |
| Process Control Sys | | | | | |
| BIOLOGICAL | | | | | |
| Bioconversion | | | | | |
| Antibodies | | | | | |
| Biosensors | | | | | |
| COMPUTING SYSTEMS | | | | | |
| Expert Sys & Neural Net | | | | | |
| Optical Computing | | | | | |
| BASIC ANALYTICAL RESEARCH | | | | | |
| New Project 1 | | | | | |
| New Project 2 | | | | | |
| New Project 3 | | | | | |
| New Project 4 | | | | | |
| New Project 5 | | | | | |
| Total Support | 29.00 | 29.00 | 29.00 | 29.00 | 29.00 |
| Total Direct | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Direct & Support | 29.00 | 29.00 | 29.00 | 29.00 | 29.00 |
| Authorized total | 29.00 | | | | |

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| | | | | | |
|--------------------------------|-------|-------|-------|-------|-------|
| ARD9195R.W20 | 1991 | 1992 | 1993 | 1994 | 1995 |
| OPERATIONS SUPPORT | | | | | |
| Adhesives | 2.00 | 4.00 | 4.00 | 3.00 | 3.00 |
| Cigarette Monitoring | | | | | |
| Materials Evaluation | 3.50 | 3.50 | 3.00 | 3.00 | 3.00 |
| Customer Complaints-T/O/S | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Flavor Dev/Analytical Sup | | | | | |
| Marlboro Standardization | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Alt Humectants/Preserv | | | | | |
| Micro Quality Improv | | | | | |
| Monogram Inks | | | | | |
| Packaging - Inks & Solvents | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 |
| Semiworks Support | | | | | |
| Burley Spray/Dry Flavors | | | | | |
| Flavor Specs/Certs | 1.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| ETS Studies | 1.00 | 1.00 | 1.50 | 1.50 | 1.50 |
| Entomological Support | 1.00 | 1.00 | 0.50 | 0.50 | 0.50 |
| Project Warhol | | | | | |
| Engineering Stud/Methods | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |
| Recon Sheet Certification | | | | | |
| Cooperative Leaf Studies | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 |
| Environmental Issues | 4.50 | 5.00 | 5.50 | 6.00 | 7.50 |
| PROJECT TOMORROW | 1.00 | 2.00 | 2.00 | 3.00 | 1.00 |
| OPTICAL PROCESSING | | | | | |
| NEW EXPANSION PROCESS | 3.00 | 3.00 | 3.00 | 2.50 | 2.00 |
| CAST LEAF RCB PROCESS | 2.00 | 2.00 | 2.50 | 2.50 | 2.50 |
| PROJECT ART | | | | | |
| Art Sup of Current proc | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Art Process Development | 4.00 | 3.00 | 2.50 | 2.00 | 1.00 |
| Art Total | | | | | |
| PROJECT BETA | 2.00 | 3.00 | 5.00 | 6.00 | 6.00 |
| PROJECT SIGMA | | | | | |
| TSNA | | 0.50 | 1.00 | 0.50 | |
| LBA | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| REDUCED SS/PAPER TECH | 6.50 | 6.00 | 5.50 | 5.50 | 5.50 |
| PROJECT AMBROSIA/ASH TRAY ODOR | 2.00 | 2.50 | 2.50 | 1.00 | 0.00 |
| PROJECT PACT | | | | | |
| LOW TAR/HIGH FLAVOR | 1.00 | 1.00 | 1.50 | 1.50 | 1.50 |
| FILTER RESEARCH | | | | | |
| Domestic | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| International | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| INTERNATIONAL PRODUCT SUPPORT | | | | | |
| PM USA | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 |
| PM PI | | | | | |
| PROJECT NATURAL | | | | | |
| INGREDIENTS | | | | | |
| MENTHOL | | | | | |
| REDUCED TAR & NICOTINE INTL | | | | | |
| SELECTIVE FILTRATION | 1.50 | 1.50 | 1.00 | 1.00 | 1.00 |
| NEW PACKAGING CONCEPTS | | | | | |
| PROCESS DEV STUDIES | | | | | |
| COMBUSTION RESEARCH | | 0.00 | 0.00 | 0.00 | 0.00 |
| Mass Burn Control | | | | | |
| Pyrolysis Temp Control | | 1.00 | 1.00 | 1.00 | 1.00 |
| FLAVORS | | | | | |
| Thermal Flavor Release | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 |
| Flavor Formation Studies | | | | | |
| Fragrances | | | | | |
| Volatile Flavors | | | | | |
| AEROSOLS | | | | | |
| Formation Mechanisms | | | | | |
| Short Lived Aerosols | | | | | |
| SELECTIVE SEPARATIONS | | | | | |
| Supercritical Technology | 2.00 | 3.00 | 3.00 | 3.00 | 4.00 |
| Membrane Separation | | | | | |
| CONSUMER TESTING RESEARCH | | | | | |
| Regression Based Mod of Lik | | | | | |
| Stochastic Discrimination Mod | | | | | |
| Cost/Benefit Eval | | | | | |
| Quant Mod of Market Dynamics | | | | | |
| CHEMICAL SENSES | | | | | |
| Electrophysiological Stud | | | | | |
| Trigeminal Stud | | | | | |
| Odor Panel | | | | | |
| Room Odor Panel | | | | | |
| Flav Response/ Chm Aspects | 0.50 | 1.00 | 2.00 | 2.50 | 3.00 |
| Struct-Act Relationships | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | |
| Process Control Sys | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| BIOLOGICAL | | | | | |
| Bioconversion | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Antibodies | | | | | |
| Biosensors | | | | 0.50 | 1.00 |
| COMPUTING SYSTEMS | | | | | |
| Expert Sys & Neural Net | | | | | |
| Optical Computing | | | | | |
| BASIC ANALYTICAL RESEARCH | 2.00 | 2.00 | 2.00 | 2.50 | 3.00 |
| New Project 1 | | | | | |
| New Project 2 | | | | | |
| New Project 3 | | | | | |
| New Project 4 | | | | | |
| New Project 5 | | | | | |
| Total Support | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Total Direct | 57.00 | 60.00 | 63.00 | 63.00 | 63.00 |
| Total Direct & Support | 58.00 | 61.00 | 64.00 | 64.00 | 64.00 |
| Authorized total | 58.00 | | | | |

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| BCR9195R.W20 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---------------------------------|-------|-------|-------|-------|-------|
| OPERATIONS SUPPORT | | | | | |
| Adhesives | | | | | |
| Cigarette Monitoring | | | | | |
| Materials Evaluation | | | | | |
| Customer Complaints-T/O/S | | | | | |
| Flavor Dev/Analytical Sup | | | | | |
| Marlboro Standardization | | | | | |
| Alt Humectants/Preserv | 10.25 | 0.00 | 0.00 | 0.00 | 0.00 |
| Micro Quality Improv/Tob Micro | 4.10 | 6.00 | 7.00 | 7.00 | 7.00 |
| Monogram Inks | | | | | |
| Packaging - Inks & Solvents | | | | | |
| Semiworks Support | | | | | |
| Burley Spray/Dry Flavors | | | | | |
| Flavor Specs/Certs | | | | | |
| BTS Studies | | | | | |
| Entomological Support | 4.30 | 3.20 | 3.20 | 3.20 | 3.20 |
| Project Warhol | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Engineering Stud/Methods | | | | | |
| Recon Sheet Certification | | | | | |
| Cooperative Leaf Studies | | | | | |
| Environmental Issues | 1.00 | 1.50 | 1.50 | 2.20 | 2.20 |
| PROJECT TOMORROW | | | | | |
| OPTICAL PROCESSING | | | | | |
| NEW EXPANSION PROCESS | | | | | |
| CAST LEAF RCB PROCESS | | | | | |
| PROJECT ART | | | | | |
| Art Sup of Current proc | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 |
| Art Process Development | 0.4 | 0.50 | 0.50 | 0.00 | 0.00 |
| Art Total | | | | | |
| PROJECT BETA | | | 1.00 | 1.00 | 1.00 |
| PROJECT SIGMA | | | | | |
| TSNA | 18.40 | 17.85 | 12.60 | 10.40 | 11.40 |
| LBA | 10.40 | 9.00 | 9.00 | 12.00 | 12.00 |
| REDUCED: SS/PAPER TECH | 1.10 | 1.50 | 4.00 | 3.00 | 3.00 |
| PROJECT AMBROSIA/ASH: TRAY ODOR | 0.10 | 0.10 | 0.00 | 0.00 | 0.00 |
| PROJECT PACT | | | | | |
| LOW TAR/HIGH FLAVOR | 1.50 | 1.00 | 0.50 | 0.50 | 0.50 |
| FILTER RESEARCH | | | | | |
| Domestic | | | | | |
| International | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | | | | | |
| INTERNATIONAL PRODUCT SUPPORT | | | | | |
| PM USA | | | | | |
| PM FI | | | | | |
| PROJECT NATURAL | | | | | |
| INGREDIENTS | 0.20 | 0.50 | 0.70 | 0.70 | 0.70 |
| MENTHOL | | | | | |
| REDUCED TAR & NICOTINE INTL | | | | | |
| SELECTIVE FILTRATION | | | | | |
| NEW PACKAGING CONCEPTS | | | | | |
| PROCESS DEV STUDIES | | | | | |
| COMBUSTION RESEARCH | | | | | |
| Mass Burn Control | | | | | |
| Pyrolysis Temp Control | | | | | |
| FLAVORS | | | | | |
| Thermal Flavor Release | | | | | |
| Flavor Formation Studies | | | | | |
| Fragrances | | | | | |
| Volatile Flavors | | | | | |
| AEROSOLS | | | | | |
| Formation Mechanisms | | | | | |
| Short Lived Aerosols | | | | | |
| SELECTIVE SEPARATIONS | | | | | |
| Supercritical Technology | 0.40 | 0.10 | 0.00 | 0.00 | 0.00 |
| Membrane Separation | | | | | |
| CONSUMER TESTING RESEARCH | | | | | |
| Regression Based Mod of Lik | | | | | |
| Stochastic Discrimination Mod | | | | | |
| Cost/Benefit Eval | | | | | |
| Quant Mod of Market Dynamics | | | | | |
| CHEMICAL SENSES | | | | | |
| Electrophysiological Stud | 0.60 | 1.00 | 1.00 | 1.00 | 1.00 |
| Trigeminal Stud | 0.25 | 0.75 | 1.00 | 1.00 | 1.00 |
| Odor Panel | | | | | |
| Room Odor Panel | | | | | |
| Flav Response/ Chm Aspects | | 0.50 | 1.00 | 1.00 | 1.00 |
| Struct-Act Relationships | 0.20 | 0.50 | 1.00 | 1.00 | 1.00 |
| MEAS & SENS OF PHY & CHM CHAR | | | | | |
| Process Control Sys | | | | | |
| BIOLOGICAL | | | | | |
| Bioconversion | 2.20 | 2.00 | 1.00 | 1.00 | 1.00 |
| Antibodies | 0.70 | 1.00 | 1.00 | 1.00 | 1.00 |
| Biosensors | 1.30 | 2.00 | 3.00 | 3.00 | 3.00 |
| COMPUTING SYSTEMS | | | | | |
| Expert Sys & Neural Net | | | | | |
| Optical Computing | | | | | |
| BASIC ANALYTICAL RESEARCH | | | | | |
| Plant Tissue Culture | 1.35 | 2.00 | 2.00 | 2.00 | 2.00 |
| New Project 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Biochemical Processing | | | 1.00 | 2.00 | 2.00 |
| New Project 3 | | | | | |
| New Project 4 | | | | | |
| New Project 5 | | | | | |
| Total Support | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Direct | 50.00 | 51.00 | 52.00 | 53.00 | 54.00 |
| Total Direct & Support | 50.00 | 51.00 | 52.00 | 53.00 | 54.00 |
| Allocated Total | 50.00 | | | | |

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| | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------------------------|-------|-------|-------|-------|-------|
| CAD9195R.W20 | | | | | |
| OPERATIONS SUPPORT | | | | | |
| Adhesives | | | | | |
| Cigarette Monitoring | | | | | |
| Materials Evaluation | | | | | |
| Customer Complaints-T/O/S | | | | | |
| Flavor Dev/Analytical Sup | | | | | |
| Marlboro Standardization | | | | | |
| Alt Humectants/Preserv | | | | | |
| Micro Quality Improv | | | | | |
| Monogram Inks | | | | | |
| Packaging - Inks & Solvents | | | | | |
| Semiworks Support | | | | | |
| Burley Spray/Dry Flavors | | | | | |
| Flavor Specs/Certs | | | | | |
| ETS Studies | | | | | |
| Entomological Support | | | | | |
| Project Warhol | | | | | |
| Engineering Stud/Methods | | | | | |
| Recon Sheet Certification | | | | | |
| Cooperative Leaf Studies | | | | | |
| Environmental Issues | | | | | |
| PROJECT TOMORROW | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| OPTICAL PROCESSING | | | | | |
| NEW EXPANSION PROCESS | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| CAST LEAF RCB PROCESS | | | | | |
| PROJECT ART | | | | | |
| Art Sup of Current proc | | | | | |
| Art Process Development | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| Art Total | | | | | |
| PROJECT BETA | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 |
| PROJECT SIGMA | | | | | |
| TSNA | | | | | |
| LBA | | | | | |
| REDUCED SS/PAPER TECH | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| PROJECT AMBROSIA/ASH TRAY ODOR | | | | | |
| PROJECT PACT | | | | | |
| LOW TAR/HIGH FLAVOR | | | | | |
| FILTER RESEARCH | | | | | |
| Domestic | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| International | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| INTERNATIONAL PRODUCT SUPPORT | | | | | |
| PM USA | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| PM PI | | | | | |
| PROJECT NATURAL | | | | | |
| INGREDIENTS | | | | | |
| MENTHOL | | | | | |
| REDUCED TAR & NICOTINE INTL | | | | | |
| SELECTIVE FILTRATION | | | | | |
| NEW PACKAGING CONCEPTS | | | | | |
| PROCESS DEV STUDIES | | | | | |
| COMBUSTION RESEARCH | | | | | |
| Mass Burn Control | | | | | |
| Pyrolysis Temp Control | | | | | |
| FLAVORS | | | | | |
| Thermal Flavor Release | | | | | |
| Flavor Formation Studies | | | | | |
| Fragrances | | | | | |
| Volatile Flavors | | | | | |
| AEROSOLS | | | | | |
| Formation Mechanisms | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Short Lived Aerosols | | | | | |
| SELECTIVE SEPARATIONS | | | | | |
| Supercritical Technology | | | | | |
| Membrane Separation | | | | | |
| CONSUMER TESTING RESEARCH | | | | | |
| Regression Based Mod of Lik | | | | | |
| Stochastic Discrimination Mod | | | | | |
| Cost/Benefit Eval | | | | | |
| Quant Mod of Market Dynamics | | | | | |
| CHEMICAL SENSES | | | | | |
| Electrophysiological Stud | | | | | |
| Trigeminal Stud | | | | | |
| Odor Panel | | | | | |
| Room Odor Panel | | | | | |
| Flav Response/ Chm Aspects | | | | | |
| Struct-Act Relationships | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | |
| Process Control Sys | | | | | |
| BIOLOGICAL | | | | | |
| Bioconversion | | | | | |
| Antibodies | | | | | |
| Biosensors | | | | | |
| COMPUTING SYSTEMS | | | | | |
| Expert Sys & Neural Net | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Optical Computing | | | | | |
| BASIC ANALYTICAL RESEARCH | | | | | |
| New Project 1 | | | | | |
| New Project 2 | | | | | |
| New Project 3 | | | | | |
| New Project 4 | | | | | |
| New Project 5 | | | | | |
| Total Support | 28.00 | 28.00 | 28.00 | 28.00 | 28.00 |
| Total Direct | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| Total Direct & Support | 33.00 | 33.00 | 33.00 | 33.00 | 33.00 |
| Allocated Total | 33.00 | | | | |

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| CHM9195R.W20 | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------------------------|-------|-------|-------|-------|-------|
| OPERATIONS SUPPORT | | | | | |
| Adhesives | | | | | |
| Cigarette Monitoring | | | | | |
| Materials Evaluation | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| Customer Complaints-T/O/S | | | | | |
| Flavor Dev/Analytical Sup | | | | | |
| Marlboro Standardization | | | | | |
| Alt Humectants/Preserv | | | | | |
| Micro Quality Improv | | | | | |
| Monogram Inks | | | | | |
| Packaging - Inks & Solvents | | | | | |
| Semiworks Support | | | | | |
| Burley Spray/Dry Flavors | | | | | |
| Flavor Specs/Certs | | | | | |
| ETS Studies | | | | | |
| Entomological Support | | | | | |
| Project Warhol | | | | | |
| Engineering Stud/Methods | | | | | |
| Recon Sheet Certification | | | | | |
| Cooperative Leaf Studies | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| Environmental Issues | | 1.00 | 1.00 | 2.00 | 3.00 |
| PROJECT TOMORROW | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 |
| OPTICAL PROCESSING | | | | | |
| NEW EXPANSION PROCESS | | | | | |
| CAST LEAF RCB PROCESS | | | | | |
| PROJECT ART | | | | | |
| Art Sup of Current proc | 1.05 | 0.00 | 0.00 | 0.00 | 0.00 |
| Art Process Development | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 |
| Art Total | | | | | |
| PROJECT BETA | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| PROJECT SIGMA | | | | | |
| TSNA | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| LBA | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| REDUCED SS/PAPER TECH | 13.00 | 12.00 | 12.00 | 11.00 | 10.00 |
| PROJECT AMBROSIA/ASH TRAY ODOR | 2.10 | 2.10 | 2.10 | 1.10 | 0.00 |
| PROJECT PACT | | | | | |
| LOW TAR/HIGH FLAVOR | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| FILTER RESEARCH | | | | | |
| Domestic | 0.05 | 1.10 | 1.10 | 1.10 | 1.10 |
| International | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | | | | | |
| INTERNATIONAL PRODUCT SUPPORT | | | | | |
| PM USA | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| PM PI | | | | | |
| PROJECT NATURAL | | | | | |
| INGREDIENTS | | | | | |
| MENTHOL | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| REDUCED TAR & NICOTINE INTL | | | | | |
| SELECTIVE FILTRATION | | 1.00 | 1.00 | 1.00 | 2.00 |
| NEW PACKAGING CONCEPTS | | | | | |
| PROCESS DEV STUDIES | | | | | |
| COMBUSTION RESEARCH | | | | | |
| Mass Burn Control | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Pyrolysis Temp Control | | 1.00 | 1.00 | 1.00 | 1.10 |
| FLAVORS | | | | | |
| Thermal Flavor Release | 1.60 | 1.60 | 1.60 | 1.60 | 1.60 |
| Flavor Formation Studies | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| Fragrances | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| Volatile Flavors | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 |
| AEROSOLS | | | | | |
| Formation Mechanisms | 1.35 | 1.35 | 1.35 | 1.35 | 1.35 |
| Short Lived Aerosols | | | | | |
| SELECTIVE SEPARATIONS | | | | | |
| Supercritical Technology | | | | | |
| Membrane Separation | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 |
| CONSUMER TESTING RESEARCH | | | | | |
| Regression Based Mod of Lik | | | | | |
| Stochastic Discrimination Mod | | | | | |
| Cost/Benefit Eval | | | | | |
| Quant Mod of Market Dynamics | | | | | |
| CHEMICAL SENSES | | | | | |
| Electrophysiological Stud | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Trigeminal Stud | | | | | |
| Odor Panel | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 |
| Room Odor Panel | | | | | |
| Flav Response/ Chm Aspects | | | | 1.00 | 1.00 |
| Struct-Act Relationships | | | | 1.00 | 1.00 |
| MEAS & SENS OF PHY & CHM CHAR | | | | | |
| Process Control Sys | | | | | |
| BIOLOGICAL | | | | | |
| Bioconversion | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| Antibodies | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| Biosensors | | | | | |
| COMPUTING SYSTEMS | | | | | |
| Expert Sys & Neural Net | | | | | |
| Optical Computing | | | | | |
| BASIC ANALYTICAL RESEARCH | | | | | |
| New Project 1 | | | | | |
| New Project 2 | | | | | |
| New Project 3 | | | | | |
| New Project 4 | | | | | |
| New Project 5 | | | | | |
| Total Support | 2.70 | 2.70 | 2.70 | 2.70 | 2.70 |
| Total Direct | 25.30 | 27.30 | 27.30 | 28.30 | 28.30 |
| Total Direct & Support | 28.00 | 30.00 | 30.00 | 31.00 | 31.00 |
| Allocated Total | 28.00 | | | | |

2026230660

| | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------------------------|-------|-------|-------|-------|-------|
| CIGDEV9195R.W20 | | | | | |
| OPERATIONS SUPPORT | | | | | |
| Adhesives | | | | | |
| Cigarette Monitoring | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| Materials Evaluation | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| Customer Complaints-T/O/S | | | | | |
| Flavor Dev/Analytical Sup | | | | | |
| Marlboro Standardization | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| Alt Humectants/Preserv | | | | | |
| Micro Quality Improv | | | | | |
| Monogram Inks | | | | | |
| Packaging - Inks & Solvents | | | | | |
| Semiworks Support | | | | | |
| Burley Spray/Dry Flavors | | | | | |
| Flavor Specs/Certs | | | | | |
| ETS Studies | | | | | |
| Entomological Support | | | | | |
| Project Warhol | | | | | |
| Engineering Stud/Methods | | | | | |
| Recon Sheet Certification | | | | | |
| Cooperative Leaf Studies | | | | | |
| Environmental Issues | | | 1.00 | 1.00 | 1.00 |
| PROJECT TOMORROW | 2.00 | 2.50 | 3.00 | 3.50 | 2.00 |
| OPTICAL PROCESSING | | | | | |
| NEW EXPANSION PROCESS | | | | | |
| CAST LEAF RCB PROCESS | | | | | |
| PROJECT ART | | | | | |
| Art Sup of Current proc | 1.00 | 0.50 | 0.50 | 0.50 | 0.50 |
| Art Process Development | | | | | |
| Art Total | | | | | |
| PROJECT BETA | | | | | |
| PROJECT SIGMA | | | | | |
| TSNA | | | | | |
| LBA | | | | | |
| REDUCED SS/PAPER TECH | 0.25 | 0.25 | 0.25 | 0.50 | 0.50 |
| PROJECT AMBROSIA/ASH TRAY ODOR | 1.75 | 1.75 | 0.75 | 0.50 | 0.50 |
| PROJECT PACT | | | | | |
| LOW TAR/HIGH FLAVOR | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 |
| FILTER RESEARCH | | | | | |
| Domestic | | | | | |
| International | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | 4.00 | 3.75 | 5.50 | 5.50 | 8.00 |
| INTERNATIONAL PRODUCT SUPPORT | | | | | |
| PM USA | | | | | |
| PM PI | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| PROJECT NATURAL | 0.50 | 0.50 | - | - | - |
| INGREDIENTS | | | | | |
| MENTHOL | 0.50 | 0.75 | 1.00 | 0.50 | 0.50 |
| REDUCED TAR & NICOTINE INTL | | | | | |
| SELECTIVE FILTRATION | | | | | |
| NEW PACKAGING CONCEPTS | | | | | |
| PROCESS DEV STUDIES | | | | | |
| COMBUSTION RESEARCH | | | | | |
| Mass Burn Control | | | | | |
| Pyrolysis Temp Control | | | | | |
| FLAVORS | | | | | |
| Thermal Flavor Release | | | | | |
| Flavor Formation Studies | | | | | |
| Fragrances | | | | | |
| Volatile Flavors | | | | | |
| AEROSOLS | | | | | |
| Formation Mechanisms | | | | | |
| Short Lived Aerosols | | | | | |
| SELECTIVE SEPARATIONS | | | | | |
| Supercritical Technology | | | | | |
| Membrane Separation | | | | | |
| CONSUMER TESTING RESEARCH | | | | | |
| Regression Based Mod of Lik | | | | | |
| Stochastic Discrimination Mod | | | | | |
| Cost/Benefit Eval | | | | | |
| Quant Mod of Market Dynamics | | | | | |
| CHEMICAL SENSES | | | | | |
| Electrophysiological Stud | | | | | |
| Trigeminal Stud | | | | | |
| Odor Panel | | | | | |
| Room Odor Panel | | | | | |
| Flav Response/ Chm Aspects | | | | | |
| Struct-Act Relationships | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | |
| Process Control Sys | | | | | |
| BIOLOGICAL | | | | | |
| Bioconversion | | | | | |
| Antibodies | | | | | |
| Biosensors | | | | | |
| COMPUTING SYSTEMS | | | | | |
| Expert Sys & Neural Net | | | | | |
| Optical Computing | | | | | |
| BASIC ANALYTICAL RESEARCH | | | | | |
| New Project 1 | | | | | |
| New Project 2 | | | | | |
| New Project 3 | | | | | |
| New Project 4 | | | | | |
| New Project 5 | | | | | |
| Total Support | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Direct | 13.00 | 13.00 | 14.00 | 14.00 | 15.00 |
| Total Direct & Support | 13.00 | 13.00 | 14.00 | 14.00 | 15.00 |
| Allocated Total | 13.00 | | | | |

2026230661

| | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------------------------|-------|-------|-------|-------|-------|
| CIGTEC9195.W20 | | | | | |
| OPERATIONS SUPPORT | | | | | |
| Adhesives | | | | | |
| Cigarette Monitoring | | | | | |
| Materials Evaluation | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Customer Complaints-T/O/S | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 |
| Flavor Dev/Analytical Sup | | | | | |
| Marlboro Standardization | | | | | |
| Alt Humectants/Preserv | | | | | |
| Micro Quality Improv | | | | | |
| Monogram Inks | | | | | |
| Packaging - Inks & Solvents | 2.75 | 2.75 | 2.50 | 2.50 | 2.50 |
| Semiworks Support | | | | | |
| Burley Spray/Dry Flavors | | | | | |
| Flavor Specs/Certs | | | | | |
| ETS Studies | | | | | |
| Entomological Support | | | | | |
| Project Warhol | | | | | |
| Engineering Stud/Methods | | | | | |
| Recon Sheet Certification | | | | | |
| Cooperative Leaf Studies | | | | | |
| Environmental Issues | | | | | |
| PROJECT TOMORROW | 1.25 | 1.50 | 1.50 | 1.50 | 1.50 |
| OPTICAL PROCESSING | | | | | |
| NEW EXPANSION PROCESS | | | | | |
| CAST LEAF RGB PROCESS | | | | | |
| PROJECT ART | | | | | |
| Art Sup of Current proc | 0.25 | 0.25 | 0.00 | 0.00 | 0.00 |
| Art Process Development | | | | | |
| Art Total | | | | | |
| PROJECT BETA | | | | | |
| PROJECT SIGMA | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 |
| TSNA | | | | | |
| LBA | | | | | |
| REDUCED SS/PAPER TECH | 11.25 | 12.25 | 12.75 | 12.75 | 12.75 |
| PROJECT AMBROSIA/ASH TRAY ODOR | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PROJECT PACT | | | | | |
| LOW TAR/HIGH FLAVOR | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| FILTER RESEARCH | | | | | |
| Domestic | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| International | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 |
| DOMESTIC PRODUCT DEVELOPMENT | 1.75 | 2.00 | 2.00 | 2.00 | 2.00 |
| INTERNATIONAL PRODUCT SUPPORT | | | | | |
| PM: USA | 1.50 | 1.75 | 1.75 | 1.75 | 1.75 |
| PM: PI | | | | | |
| PROJECT NATURAL | | | | | |
| INGREDIENTS | | | | | |
| MENTHOL | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| REDUCED TAR & NICOTINE INTL | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| SELECTIVE FILTRATION | 0.40 | 0.75 | 0.75 | 0.75 | 0.75 |
| NEW PACKAGING CONCEPTS | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| PROCESS DEV STUDIES (FILTER) | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 |
| COMBUSTION RESEARCH | | | | | |
| Mass Burn Control | | | | | |
| Pyrolysis Temp Control | | | | | |
| FLAVORS | | | | | |
| Thermal Flavor Release | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| Flavor Formation Studies | | | | | |
| Fragrances | | | | | |
| Volatile Flavors | | | | | |
| AEROSOLS | | | | | |
| Formation Mechanisms | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| Short Lived Aerosols | | | | | |
| SELECTIVE SEPARATIONS | | | | | |
| Supercritical Technology | | | | | |
| Membrane Separation | | | | | |
| CONSUMER TESTING RESEARCH | | | | | |
| Regression Based Mod of Lik | | | | | |
| Stochastic Discrimination Mod | | | | | |
| Cost/Benefit Eval | | | | | |
| Quant Mod of Market Dynamics | | | | | |
| CHEMICAL SENSES | | | | | |
| Electrophysiological Stud | | | | | |
| Trigeminal Stud | | | | | |
| Odor Panel | | | | | |
| Room Odor Panel | | | | | |
| Flav Response/ Chm Aspects | | | | | |
| Struct-Act Relationships | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | |
| Process Control Sys | | | | | |
| BIOLOGICAL | | | | | |
| Bioconversion | | | | | |
| Antibodies | | | | | |
| Biosensors | | | | | |
| COMPUTING SYSTEMS | | | | | |
| Expert Sys & Neural Net | | | | | |
| Optical Computing | | | | | |
| BASIC ANALYTICAL RESEARCH | | | | | |
| PROCESS PLANT SUPPORT | | | | | |
| New Project 2 | | | | | |
| New Project 3 | | | | | |
| New Project 4 | | | | | |
| New Project 5 | | | | | |
| Total Support | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Direct | 29.00 | 31.00 | 31.00 | 31.00 | 31.00 |
| Total Direct & Support | 29.00 | 31.00 | 31.00 | 31.00 | 31.00 |
| Allocated Total | 29.00 | 31.00 | 31.00 | 31.00 | 31.00 |

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| GTSD9195R.W20: | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------------------------|-------|-------|-------|-------|-------|
| OPERATIONS SUPPORT | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Adhesives | | | | | |
| Cigarette Monitoring | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| Materials Evaluation | | | | | |
| Customer Complaints-T/O/S | | | | | |
| Flavor Dev/Analytical Sup | | | | | |
| Marlboro Standardization | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| Alt Humectants/Preserv | | | | | |
| Micro Quality Improv | | | | | |
| Monogram Inks | | | | | |
| Packaging - Inks & Solvents | | | | | |
| Semiworks Support | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Burley Spray/Dry Flavors | | | | | |
| Flavor Specs/Certs | | | | | |
| ETS Studies | | | | | |
| Entomological Support | | | | | |
| Project Warhol | | | | | |
| Engineering Stud/Methods | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| Recon Sheet Certification | | | | | |
| Cooperative Leaf Studies | | | | | |
| Environmental Issues | | 1.00 | 1.00 | 1.00 | 1.00 |
| PROJECT TOMORROW | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| OPTICAL PROCESSING | | | | | |
| NEW EXPANSION PROCESS | | | | | |
| CAST LEAF RGB PROCESS | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 |
| PROJECT ART | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Art Sup of Current proc | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Art Process Development | | | | | |
| Art Total | | | | | |
| PROJECT BETA | | | | | |
| PROJECT SIGMA | | | | | |
| TSNA | | | | | |
| LBA | | | | | |
| REDUCED SS/PAPER TECH | | | | | |
| PROJECT AMBROSIA/ASH TRAY ODOR | | | | | |
| PROJECT PACT | | | | | |
| LOW TAR/HIGH FLAVOR | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 |
| FILTER RESEARCH | | | | | |
| Domestic | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| International | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | 14.00 | 14.00 | 14.00 | 14.00 | 14.00 |
| INTERNATIONAL PRODUCT SUPPORT | | | | | |
| PM USA | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| PM PI | 22.00 | 22.00 | 22.00 | 22.00 | 22.00 |
| PROJECT NATURAL | | | | | |
| INGREDIENTS | | | | | |
| MENTHOL | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| REDUCED TAR & NICOTINE INTL | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| SELECTIVE FILTRATION | | | | | |
| NEW PACKAGING CONCEPTS | | | | | |
| PROCESS DEV STUDIES | | | | | |
| COMBUSTION RESEARCH | | | | | |
| Mass Burn Control | | | | | |
| Pyrolysis Temp Control | | | | | |
| FLAVORS | | | | | |
| Thermal Flavor Release | | | | | |
| Flavor Formation Studies | | | | | |
| Fragrances | | | | | |
| Volatile Flavors | | | | | |
| AEROSOLS | | | | | |
| Formation Mechanisms | | | | | |
| Short Lived Aerosols | | | | | |
| SELECTIVE SEPARATIONS | | | | | |
| Supercritical Technology | | | | | |
| Membrane Separation | | | | | |
| CONSUMER TESTING RESEARCH | | | | | |
| Regression Based Mod of Lik | | | | | |
| Stochastic Discrimination Mod | | | | | |
| Cost/Benefit Eval | | | | | |
| Quant Mod of Market Dynamics | | | | | |
| CHEMICAL SENSES | | | | | |
| Electrophysiological Stud | | | | | |
| Trigeminal Stud | | | | | |
| Odor Panel | | | | | |
| Room Odor Panel | | | | | |
| Flav Response/ Chm Aspects | | | | | |
| Struct-Act Relationships | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | |
| Process Control Sys | | | | | |
| BIOLOGICAL | | | | | |
| Bioconversion | | | | | |
| Antibodies | | | | | |
| Biosensors | | | | | |
| COMPUTING SYSTEMS | | | | | |
| Expert Sys & Neural Net | | | | | |
| Optical Computing | | | | | |
| BASIC ANALYTICAL RESEARCH | | | | | |
| New Project 1 | | | | | |
| New Project 2 | | | | | |
| New Project 3 | | | | | |
| New Project 4 | | | | | |
| New Project 5 | | | | | |
| Total Support | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 |
| Total Direct | 26.00 | 26.00 | 26.00 | 26.00 | 26.00 |
| Total Direct & Support | 37.00 | 37.00 | 37.00 | 37.00 | 37.00 |
| Allocated Total | 37.00 | | | | |

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| | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------------------------|-------|-------|-------|-------|-------|
| DEVENG9195R.W20 | | | | | |
| OPERATIONS SUPPORT | | | | | |
| Adhesives: | | | | | |
| Cigarette Monitoring: | | | | | |
| Materials Evaluation: | | | | | |
| Customer Complaints-T/O/S | | | | | |
| Flavor Dev/Analytical Sup | | | | | |
| Marlboro Standardization | | | | | |
| Alt Humectants/Preserv | | | | | |
| Micro Quality Improv | | | | | |
| Monogram Inks | | | | | |
| Packaging - Inks & Solvents | | | | | |
| Semiworks Support | | | | | |
| Burley Spray/Dry Flavors | | | | | |
| Flavor Specs/Certs | | | | | |
| ETS Studies | | | | | |
| Entomological Support | | | | | |
| Project Warhol | | | | | |
| Engineering Stud/Methods | | | | | |
| Recon Sheet Certification | | | | | |
| Cooperative Leaf Studies | | | | | |
| Environmental Issues | | | | | |
| PROJECT TOMORROW | 0.20 | 0.20 | | | |
| OPTICAL PROCESSING | 0.20 | 0.20 | | | |
| NEW EXPANSION PROCESS | 3.5 | 3.50 | | | |
| CAST LEAF RCB PROCESS | 0.80 | 0.80 | | | |
| PROJECT ART | | | | | |
| Art Sup of Current proc | 0.40 | 0.40 | | | |
| Art Process Development | 1.1 | 1.10 | | | |
| Art Total | | | | | |
| PROJECT BETA | 1.7 | 0.70 | | | |
| PROJECT SIGMA | | | | | |
| TSNA | | | | | |
| LBA | | | | | |
| REDUCED SS/PAPER TECH | | | | | |
| PROJECT AMBROSIA/ASH TRAY ODOR | | | | | |
| PROJECT PACT | 0.40 | 0.00 | | | |
| LOW TAR/HIGH FLAVOR | | | | | |
| FILTER RESEARCH | | | | | |
| Domestic | | | | | |
| International | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | | | | | |
| INTERNATIONAL PRODUCT SUPPORT | | | | | |
| PM USA | | | | | |
| PM FI | | | | | |
| PROJECT NATURAL | | | | | |
| INGREDIENTS | | | | | |
| MENTHOL | 1.20 | 1.20 | | | |
| REDUCED TAR & NICOTINE INTL | | | | | |
| SELECTIVE FILTRATION | | | | | |
| NEW PACKAGING CONCEPTS | | | | | |
| PROCESS DEV STUDIES | | | | | |
| COMBUSTION RESEARCH | | | | | |
| Mass Burn Control | | | | | |
| Pyrolysis Temp Control | | | | | |
| FLAVORS | | | | | |
| Thermal Flavor Release | | | | | |
| Flavor Formation Studies | | | | | |
| Fragrances | | | | | |
| Volatile Flavors | | | | | |
| AEROSOLS | | | | | |
| Formation Mechanisms | | | | | |
| Short Lived Aerosols | | | | | |
| SELECTIVE SEPARATIONS | | | | | |
| Supercritical Technology | | | | | |
| Membrane Separation | | | | | |
| CONSUMER TESTING RESEARCH | | | | | |
| Regression Based Mod of Lik | | | | | |
| Stochastic Discrimination Mod | | | | | |
| Cost/Benefit Eval | | | | | |
| Quant Mod of Market Dynamics | | | | | |
| CHEMICAL SENSES | | | | | |
| Electrophysiological Stud | | | | | |
| Trigeminal Stud | | | | | |
| Odor Panel | | | | | |
| Room Odor Panel | | | | | |
| Flav Response/ Chm Aspects | | | | | |
| Struct-Act Relationships | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | |
| Process Control Sys | | | | | |
| BIOLOGICAL | | | | | |
| Bioconversion | | | | | |
| Antibodies | | | | | |
| Biosensors | | | | | |
| COMPUTING SYSTEMS | | | | | |
| Expert Sys & Neural Net | | | | | |
| Optical Computing | | | | | |
| BASIC ANALYTICAL RESEARCH | | | | | |
| New Project 1 | | | | | |
| New Project 2 | | | | | |
| New Project 3 | | | | | |
| New Project 4 | | | | | |
| New Project 5 | | | | | |
| Total Support | 16.50 | 17.90 | 26.00 | 26.00 | 26.00 |
| Total Direct | 9.50 | 8.10 | 0.00 | 0.00 | 0.00 |
| Total Direct & Support | 26.00 | 26.00 | 26.00 | 26.00 | 26.00 |
| Allocated Total | 26.00 | | | | |

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| | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------------------------|-------|-------|-------|-------|-------|
| EXEC/ADMIN | | | | | |
| OPERATIONS SUPPORT | | | | | |
| Adhesives | | | | | |
| Cigarette Monitoring | | | | | |
| Materials Evaluation | | | | | |
| Customer Complaints-T/O/S | | | | | |
| Flavor Dev/Analytical Sup | | | | | |
| Marlboro Standardization | | | | | |
| Alt Humectants/Preserv | | | | | |
| Micro Quality Improv | | | | | |
| Monogram Inks | | | | | |
| Packaging - Inks & Solvents | | | | | |
| Semiworks Support | | | | | |
| Burley Spray/Dry Flavors | | | | | |
| Flavor Specs/Certs | | | | | |
| ETS Studies | | | | | |
| Entomological Support | | | | | |
| Project Warhol | | | | | |
| Engineering Stud/Methods | | | | | |
| Recon Sheet Certification | | | | | |
| Cooperative Leaf Studies | | | | | |
| Environmental Issues | | | | | |
| PROJECT TOMORROW | | | | | |
| OPTICAL PROCESSING | | | | | |
| NEW EXPANSION PROCESS | | | | | |
| CAST LEAF RCB PROCESS | | | | | |
| PROJECT ART | | | | | |
| Art Sup of Current proc | | | | | |
| Art Process Development | | | | | |
| Art Total | | | | | |
| PROJECT BETA | | | | | |
| PROJECT SIGMA | | | | | |
| TSNA | | | | | |
| LBA | | | | | |
| REDUCED SS/PAPER TECH | | | | | |
| PROJECT AMBROSIA/ASH TRAY ODOR | | | | | |
| PROJECT PACT | | | | | |
| LOW TAR/HIGH FLAVOR | | | | | |
| FILTER RESEARCH | | | | | |
| Domestic | | | | | |
| International | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | | | | | |
| INTERNATIONAL PRODUCT SUPPORT | | | | | |
| PM USA | | | | | |
| PM PI | | | | | |
| PROJECT NATURAL | | | | | |
| INGREDIENTS | | | | | |
| MENTHOL | | | | | |
| REDUCED TAR & NICOTINE INTL | | | | | |
| SELECTIVE FILTRATION | | | | | |
| NEW PACKAGING CONCEPTS | | | | | |
| PROCESS DEV STUDIES | | | | | |
| COMBUSTION RESEARCH | | | | | |
| Mass Burn Control | | | | | |
| Pyrolysis Temp Control | | | | | |
| FLAVORS | | | | | |
| Thermal Flavor Release | | | | | |
| Flavor Formation Studies | | | | | |
| Fragrances | | | | | |
| Volatile Flavors | | | | | |
| AEROSOLS | | | | | |
| Formation Mechanisms | | | | | |
| Short Lived Aerosols | | | | | |
| SELECTIVE SEPARATIONS | | | | | |
| Supercritical Technology | | | | | |
| Membrane Separation | | | | | |
| CONSUMER TESTING RESEARCH | | | | | |
| Regression Based Mod of Lik | | | | | |
| Stochastic Discrimination Mod | | | | | |
| Cost/Benefit Eval | | | | | |
| Quant Mod of Market Dynamics | | | | | |
| CHEMICAL SENSES | | | | | |
| Electrophysiological Stud | | | | | |
| Trigeminal Stud | | | | | |
| Odor Panel | | | | | |
| Room Odor Panel | | | | | |
| Flav Response/Chm Aspects | | | | | |
| Struct-Act Relationships | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | |
| Process Control Sys | | | | | |
| BIOLOGICAL | | | | | |
| Bioconversion | | | | | |
| Antibodies | | | | | |
| Biosensors | | | | | |
| COMPUTING SYSTEMS | | | | | |
| Expert Sys & Neural Net | | | | | |
| Optical Computing | | | | | |
| BASIC ANALYTICAL RESEARCH | | | | | |
| New Project 1 | | | | | |
| New Project 2 | | | | | |
| New Project 3 | | | | | |
| New Project 4 | | | | | |
| New Project 5 | | | | | |
| Total Support | 43.00 | 43.00 | 43.00 | 43.00 | 43.00 |
| Total Direct | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Direct & Support | 43.00 | 43.00 | 43.00 | 43.00 | 43.00 |
| Allocated Total | 43.00 | | | | |

2026230665

| FLADEV9195R.W20: | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------------------------|-------|-------|-------|-------|-------|
| OPERATIONS SUPPORT | | | | | |
| Adhesives | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| Cigarette Monitoring | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Materials Evaluation | | | | | |
| Customer Complaints-T/O/S | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Flavor Dev/Analytical Sup | 0.20 | 0.70 | 1.25 | 1.45 | 1.45 |
| Marlboro Standardization | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Alt Humectants/Preserv | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Micro Quality Improv | | | | | |
| Monogram Inks | | | | | |
| Packaging - Inks & Solvents | 0.20 | 0.20 | 0.35 | 0.35 | 0.35 |
| Semiworks Support | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Burley Spray/Dry Flavors | 0.10 | 0.10 | 0.50 | 0.50 | 0.50 |
| Flavor Specs/Certs | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 |
| ETS Studies | | | | | |
| Entomological Support | | | | | |
| Project Warhol | | | | | |
| Engineering Stud/Methods | 0.00 | 0.00 | 0.20 | 1.00 | 1.00 |
| Recon Sheet Certification | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cooperative Leaf Studies | | | | | |
| Environmental Issues | 0.30 | 0.30 | 0.50 | 0.50 | 0.50 |
| PROJECT TOMORROW | 1.25 | 1.50 | 1.00 | 0.50 | 0.00 |
| OPTICAL PROCESSING | | | | | |
| NEW EXPANSION PROCESS | 0.85 | 0.60 | 0.60 | 0.60 | 0.60 |
| CAST LEAF RCB PROCESS | 0.70 | 0.50 | 0.50 | 0.10 | 0.00 |
| PROJECT ART | | | | | |
| Art Sup of Current proc | 0.25 | 0.25 | 0.25 | 0.10 | 0.10 |
| Art Process Development | 1.00 | 1.00 | 0.50 | 0.10 | 0.10 |
| Art Total | | | | | |
| PROJECT BETA | 0.25 | 1.00 | 1.25 | 1.25 | 1.25 |
| PROJECT SIGMA | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| TSNA | | | | | |
| LBA | | | | | |
| REDUCED SS/PAPER TECH | 0.60 | 0.25 | 0.25 | 0.25 | 0.25 |
| PROJECT AMBROSIA/ASH TRAY ODOR | 1.00 | 0.80 | 0.50 | 0.50 | 0.25 |
| PROJECT PACT | | | | | |
| LOW TAR/HIGH FLAVOR | 2.35 | 2.35 | 3.25 | 3.00 | 3.00 |
| FILTER RESEARCH | 0.00 | | | | |
| Domestic | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| International | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DOMESTIC PRODUCT DEVELOPMENT | 4.15 | 4.55 | 5.05 | 5.05 | 5.05 |
| INTERNATIONAL PRODUCT SUPPORT | | | | | |
| PM USA | 2.00 | 3.00 | 3.00 | 4.25 | 5.00 |
| PM PI | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| PROJECT NATURAL | 0.20 | 0.20 | 0.00 | 0.00 | 0.00 |
| INGREDIENTS | | | | | |
| MENTHOL | 2.00 | 2.00 | 2.35 | 2.50 | 3.00 |
| REDUCED TAR & NICOTINE INTL | 0.20 | 0.20 | 0.20 | 0.00 | 0.00 |
| SELECTIVE FILTRATION | | | | | |
| NEW PACKAGING CONCEPTS | | | | | |
| PROCESS DEV STUDIES | | | | | |
| COMBUSTION RESEARCH | | | | | |
| Mass Burn Control | | | | | |
| Pyrolysis Temp Control | | | | | |
| FLAVORS | | | | | |
| Thermal Flavor Release | 1.00 | 1.00 | 1.00 | 1.10 | 1.35 |
| Flavor Formation Studies | 1.00 | 1.00 | 1.00 | 1.10 | 1.35 |
| Fragrances | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| Volatile Flavors | 0.45 | 0.45 | 0.45 | 0.75 | 0.75 |
| AEROSOLS | | | | | |
| Formation Mechanisms | | | | | |
| Short Lived Aerosols | | | | | |
| SELECTIVE SEPARATIONS | | | | | |
| Supercritical Technology | | | | | |
| Membrane Separation | | | | | |
| CONSUMER TESTING RESEARCH | | | | | |
| Regression Based Mod of Lix | | | | | |
| Stochastic Discrimination Mod | | | | | |
| Cost/Benefit Eval | | | | | |
| Quant Mod of Market Dynamics | | | | | |
| CHEMICAL SENSES | | | | | |
| Electrophysiological Stud | | | | | |
| Trigeminal Stud | | | | | |
| Odor Panel | | | | | |
| Room Odor Panel | | | | | |
| Flav Response/ Chm Aspects | | | | | |
| Struct-Act Relationships | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | |
| Process Control Sys | | | | | |
| BIOLOGICAL | | | | | |
| Bioconversion | | | | | |
| Antibodies | | | | | |
| Biosensors | | | | | |
| COMPUTING SYSTEMS | | | | | |
| Expert Sys & Neural Net | | | | | |
| Optical Computing | | | | | |
| BASIC ANALYTICAL RESEARCH | | | | | |
| PROCESS PLANT SUPPORT | 0.40 | 0.50 | 0.50 | 0.50 | 0.60 |
| New Project 2 | | | | | |
| New Project 3 | | | | | |
| New Project 4 | | | | | |
| New Project 5 | | | | | |
| Total Support | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Direct | 23.00 | 25.00 | 27.00 | 28.00 | 29.00 |
| Total Direct & Support | 23.00 | 25.00 | 27.00 | 28.00 | 29.00 |
| Allocated Total | 23.00 | | | | |

2026230666

| | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------------------------|-------|-------|-------|-------|-------|
| PED9195.W20 | | | | | |
| OPERATIONS SUPPORT | | | | | |
| Adhesives | | | | | |
| Cigarette Monitoring | | | | | |
| Materials Evaluation | | | | | |
| Customer Complaints-T/O/S | | | | | |
| Flavor Dev/Analytical Sup | | | | | |
| Marlboro Standardization | | | | | |
| Alt Humectants/Preserv | | | | | |
| Micro Quality Improv | | | | | |
| Monogram Inks | | | | | |
| Packaging - Inks & Solvents | | | | | |
| Semiworks Support | | | | | |
| Burley Spray/Dry Flavors | | | | | |
| Flavor Specs/Certs | | | | | |
| ETS Studies | | | | | |
| Entomological Support | | | | | |
| Project Warhol | | | | | |
| Engineering Stud/Methods | | | | | |
| Recon Sheet Certification | | | | | |
| Cooperative Leaf Studies | | | | | |
| Environmental Issues | | | | | |
| PROJECT TOMORROW | | | | | |
| OPTICAL PROCESSING | | | | | |
| NEW EXPANSION PROCESS | | | | | |
| CAST LEAF RCB PROCESS | | | | | |
| PROJECT ART | | | | | |
| Art Sup of Current proc | | | | | |
| Art Process Development | | | | | |
| Art Total | | | | | |
| PROJECT BETA | | | | | |
| PROJECT SIGMA | | | | | |
| TSNA | | | | | |
| LBA | | | | | |
| REDUCED SS/PAPER TECH | | | | | |
| PROJECT AMBROSIA/ASH TRAY ODOR | | | | | |
| PROJECT PACT | | | | | |
| LOW TAR/HIGH FLAVOR | | | | | |
| FILTER RESEARCH | | | | | |
| Domestic | | | | | |
| International | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | 24.30 | 24.30 | 25.30 | 25.30 | 26.30 |
| INTERNATIONAL PRODUCT SUPPORT | | | | | |
| PM USA | 1 | 1.00 | 1.00 | 1.00 | 1.00 |
| PM PI | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| PROJECT NATURAL | | | | | |
| INGREDIENTS | | | | | |
| MENTHOL | | | | | |
| REDUCED TAR & NICOTINE INTL | | | | | |
| SELECTIVE FILTRATION | | | | | |
| NEW PACKAGING CONCEPTS | | | | | |
| PROCESS DEV STUDIES | | | | | |
| COMBUSTION RESEARCH | | | | | |
| Mass Burn Control | | | | | |
| Pyrolysis Temp Control | | | | | |
| FLAVORS | | | | | |
| Thermal Flavor Release | | | | | |
| Flavor Formation Studies | | | | | |
| Fragrances | | | | | |
| Volatile Flavors | | | | | |
| AEROSOLS | | | | | |
| Formation Mechanisms | | | | | |
| Short Lived Aerosols | | | | | |
| SELECTIVE SEPARATIONS | | | | | |
| Supercritical Technology | | | | | |
| Membrane Separation | | | | | |
| CONSUMER TESTING RESEARCH | | | | | |
| Regression Based Mod of Lik | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 |
| Stochastic Discrimination Mod | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| Cost/Benefit Eval | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| Quant Mod of Market Dynamics | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| CHEMICAL SENSES | | | | | |
| Electrophysiological Stud | | | | | |
| Trigeminal Stud | | | | | |
| Odor Panel | | | | | |
| Room Odor Panel | | | | | |
| Flav Response/ Chm Aspects | | | | | |
| Struct-Act Relationships | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | |
| Process Control Sys | | | | | |
| BIOLOGICAL | | | | | |
| Bioconversion | | | | | |
| Antibodies | | | | | |
| Biosensors | | | | | |
| COMPUTING SYSTEMS | | | | | |
| Expert Sys & Neural Net | | | | | |
| Optical Computing | | | | | |
| BASIC ANALYTICAL RESEARCH | | | | | |
| New Project 1 | | | | | |
| New Project 2 | | | | | |
| New Project 3 | | | | | |
| New Project 4 | | | | | |
| New Project 5 | | | | | |
| Total Support | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Direct | 28.00 | 28.00 | 29.00 | 29.00 | 30.00 |
| Total Direct & Support | 28.00 | 28.00 | 29.00 | 29.00 | 30.00 |
| Allocated Total | 28.00 | | | | |

2026230667

| | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------------------------|-------|-------|-------|-------|-------|
| PHY9195R.W20 | | | | | |
| OPERATIONS SUPPORT | | | | | |
| Adhesives | | | | | |
| Cigarette Monitoring | | | | | |
| Materials Evaluation | | | | | |
| Customer Complaints-T/O/S | | | | | |
| Flavor Dev/Analytical Sup | | | | | |
| Marlboro Standardization | | | | | |
| Alt Humectants/Preserv | | | | | |
| Micro Quality Improv | | | | | |
| Monogram Inks | 1.00 | | | | |
| Packaging - Inks & Solvents | | | | | |
| Semiworks Support | | | | | |
| Burley Spray/Dry Flavors | | | | | |
| Flavor Specs/Certs | | | | | |
| ETS Studies | | | | | |
| Entomological Support | | | | | |
| Project Warhol | | | | | |
| Engineering Stud/Methods | | | | | |
| Recon Sheet Certification | | | | | |
| Cooperative Leaf Studies | | | | | |
| Environmental Issues | | 1.00 | 1.00 | 2.00 | 3.00 |
| PROJECT TOMORROW | 6.50 | 7.00 | 8.00 | 8.00 | 6.00 |
| OPTICAL PROCESSING | 6.00 | 6.00 | 6.00 | 7.00 | 7.00 |
| NEW EXPANSION PROCESS | 8.00 | 6.00 | 5.00 | 3.00 | 3.00 |
| CAST LEAF RCB PROCESS | | | | | |
| PROJECT ART | | | | | |
| Art Sup of Current proc | 0.50 | | | | |
| Art Process Development | 0.50 | | | | |
| Art Total | | | | | |
| PROJECT BETA | 21.00 | 25.00 | 25.00 | 25.00 | 20.00 |
| PROJECT SIGMA | | | | | |
| TSNA | | | | 1.00 | 1.00 |
| LBA | | | | | |
| REDUCED SS/PAPER TECH | | | | | |
| PROJECT AMBROSIA/ASH TRAY ODOR | | | | | |
| PROJECT PACT | 0.50 | | | | |
| LOW TAR/HIGH FLAVOR | | | | | |
| FILTER RESEARCH | | | | | |
| Domestic | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 |
| International | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | | | | | |
| INTERNATIONAL PRODUCT SUPPORT | | | | | |
| PM:USA | | | | | |
| PM:PI | | | | | |
| PROJECT NATURAL | | | | | |
| INGREDIENTS | | | | | |
| MENTHOL | | | | | |
| REDUCED TAR & NICOTINE INTL | | | | | |
| SELECTIVE FILTRATION | 0.50 | 1.00 | 2.00 | 2.00 | 3.00 |
| NEW PACKAGING CONCEPTS | | | | | |
| PROCESS DEV STUDIES | | | | | |
| COMBUSTION RESEARCH | | | | | |
| Mass Burn Control | 1.00 | 1.00 | 1.00 | 1.00 | |
| Pyrolysis Temp Control | | | | | |
| FLAVORS | | | | | |
| Thermal Flavor Release | | | | | |
| Flavor Formation Studies | | | | | |
| Fragrances | | | | | |
| Volatile Flavors | | | | | |
| AEROSOLS | | | | | |
| Formation Mechanisms | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 |
| Short Lived Aerosols | 1.00 | 1.00 | 1.00 | 2.00 | 3.00 |
| SELECTIVE SEPARATIONS | | | | | |
| Supercritical Technology | | | | | |
| Membrane Separation | | | | | |
| CONSUMER TESTING RESEARCH | | | | | |
| Regression Based Mod of Lik | | | | | |
| Stochastic Discrimination Mod | | | | | |
| Cost/Benefit Eval | | | | | |
| Quant Mod of Market Dynamics | | | | | |
| CHEMICAL SENSES | | | | | |
| Electrophysiological Stud | | | | | |
| Trigeminal Stud | | | | | |
| Odor Panel | | | | | |
| Room Odor Panel | | | | | |
| Flav Response/ Chm Aspects | | | | | |
| Struct-Act Relationships | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | |
| Process Control Sys | | | | | |
| BIOLOGICAL | | | | | |
| Bioconversion | | | | | |
| Antibodies | | | | | |
| Biosensors | | | | | |
| COMPUTING SYSTEMS | | | | | |
| Expert Sys & Neural Net | | | | | |
| Optical Computing | | | | | |
| BASIC ANALYTICAL RESEARCH | | | | | |
| New Project 1 | | | | | |
| New Project 2 | | | | | |
| Alpha | | | | | 5.00 |
| New Project 4 | | | | | |
| New Project 5 | | | | | |
| Total Support | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Direct | 49.00 | 51.00 | 52.00 | 53.00 | 53.00 |
| Total Direct & Support | 49.00 | 51.00 | 52.00 | 53.00 | 53.00 |
| Allocated Total | 49.00 | | | | |

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| | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------------------------|------|------|------|------|------|
| STS-TA9195R.W20 | | | | | |
| OPERATIONS SUPPORT | | | | | |
| Adhesives | | | | | |
| Cigarette Monitoring | | | | | |
| Materials Evaluation | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| Customer Complaints-T/O/S | 0.10 | 0.10 | 0.10 | 0.20 | 0.20 |
| Flavor Dev/Analytical Sup | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Marlboro Standardization | | | | | |
| Alt Humectants/Preserv | | | | | |
| Micro Quality Improv | | | | | |
| Monogram Inks | | | | | |
| Packaging - Inks & Solvents | | | | | |
| Semiworks Support | | | | | |
| Burley Spray/Dry Flavors | | | | | |
| Flavor Specs/Certs | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| ETS Studies | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Entomological Support | | | | | |
| Project Warhol | | | | | |
| Engineering Stud/Methods | | | | | |
| Recon Sheet Certification | | | | | |
| Cooperative Leaf Studies | | | | | |
| Environmental Issues | 0.10 | 0.30 | 0.40 | 0.50 | 0.50 |
| PROJECT TOMORROW | 0.20 | 0.20 | 0.20 | | |
| OPTICAL PROCESSING | | | | | |
| NEW EXPANSION PROCESS | 0.70 | 0.80 | 1.00 | 1.20 | 1.20 |
| CAST LEAF RCB PROCESS | 0.40 | 0.50 | 0.60 | 0.80 | 0.80 |
| PROJECT ART | | | | | |
| Art Sup of Current proc | | | | | |
| Art Process Development | | | | | |
| Art Total | | | | | |
| PROJECT BETA | | | | | |
| PROJECT SIGMA | | | | | |
| TSNA | | | | | |
| LBA | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| REDUCED SS/PAPER TECH | 1.00 | 1.00 | 0.50 | 0.50 | 0.30 |
| PROJECT AMBROSIA/ASH TRAY ODOR | 0.10 | 0.10 | 0.20 | 0.00 | |
| PROJECT PACT | 0.80 | 0.60 | 0.40 | 0.20 | |
| LOW TAR/HIGH FLAVOR | | | | | |
| FILTER RESEARCH: | | | | | |
| Domestic | | | | | |
| International | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | 0.90 | 0.90 | 0.90 | 1.00 | 1.00 |
| INTERNATIONAL PRODUCT SUPPORT | | | | | |
| PM USA | | | | | |
| PM PI | | | | | |
| PROJECT NATURAL | | | | | |
| INGREDIENTS | 2.60 | 2.40 | 2.40 | 2.40 | 2.40 |
| MENTHOL | | | | | |
| REDUCED TAR & NICOTINE INTL | | | | | |
| SELECTIVE FILTRATION | | | | | |
| NEW PACKAGING CONCEPTS | | | | | |
| PROCESS DEV STUDIES | | | | | |
| COMBUSTION RESEARCH | | | | | |
| Mass Burn Control | | | | | |
| Pyrolysis Temp Control | | | | | |
| FLAVORS | | | | | |
| Thermal Flavor Release | | | | | |
| Flavor Formation Studies | | | | | |
| Fragrances | | | | | |
| Volatile Flavors | | | | | |
| AEROSOLS | | | | | |
| Formation Mechanisms | | | | | |
| Short Lived Aerosols | | | | | |
| SELECTIVE SEPARATIONS | | | | | |
| Supercritical Technology | | | | | |
| Membrane Separation | | | | | |
| CONSUMER TESTING RESEARCH | | | | | |
| Regression Based Mod of Lik | | | | | |
| Stochastic Discrimination Mod | | | | | |
| Cost/Benefit Eval | | | | | |
| Quant Mod of Market Dynamics | | | | | |
| CHEMICAL SENSES | | | | | |
| Electrophysiological Stud | | | | | |
| Trigeminal Stud | | | | | |
| Odor Panel | | | | | |
| Room Odor Panel | | | | | |
| Flav Response/ Chm Aspects | 0.30 | 0.30 | 0.50 | 0.40 | 0.80 |
| Struct-Act Relationships | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | |
| Process Control Sys | | | | | |
| BIOLOGICAL | | | | | |
| Bioconversion | | | | | |
| Antibodies | | | | | |
| Biosensors | | | | | |
| COMPUTING SYSTEMS | | | | | |
| Expert Sys & Neural Net | | | | | |
| Optical Computing | | | | | |
| BASIC ANALYTICAL RESEARCH | | | | | |
| New Project 1 | | | | | |
| New Project 2 | | | | | |
| New Project 3 | | | | | |
| New Project 4 | | | | | |
| New Project 5 | | | | | |
| Total Support | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Direct | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| Total Direct & Support | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| Allocated Total | 8.00 | | | | |

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| | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------------------------|-------|-------|-------|-------|-------|
| TIS9195R.W20 | | | | | |
| OPERATIONS SUPPORT | | | | | |
| Adhesives | | | | | |
| Cigarette Monitoring | | | | | |
| Materials Evaluation | | | | | |
| Customer Complaints-T/O/S | | | | | |
| Flavor Dev/Analytical Sup | | | | | |
| Marlboro Standardization | | | | | |
| Alt Humectants/Preserv | | | | | |
| Micro Quality Improv | | | | | |
| Monogram Inks | | | | | |
| Packaging - Inks & Solvents | | | | | |
| Semiworks Support | | | | | |
| Burley Spray/Dry Flavors | | | | | |
| Flavor Specs/Certs | | | | | |
| ETS Studies | | | | | |
| Entomological Support | | | | | |
| Project Warhol | | | | | |
| Engineering Stud/Methods | | | | | |
| Recon Sheet Certification | | | | | |
| Cooperative Leaf Studies | | | | | |
| Environmental Issues | | | | | |
| PROJECT TOMORROW | | | | | |
| OPTICAL PROCESSING | | | | | |
| NEW EXPANSION PROCESS | | | | | |
| CAST LEAF RGB PROCESS | | | | | |
| PROJECT ART | | | | | |
| Art Sup of Current proc | | | | | |
| Art Process Development | | | | | |
| Art Total | | | | | |
| PROJECT BETA | | | | | |
| PROJECT SIGMA | | | | | |
| TSNA | | | | | |
| LBA | | | | | |
| REDUCED SS/PAPER TECH | | | | | |
| PROJECT AMBROSIA/ASH TRAY ODOR | | | | | |
| PROJECT PACT | | | | | |
| LOW TAR/HIGH FLAVOR | | | | | |
| FILTER RESEARCH | | | | | |
| Domestic | | | | | |
| International | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | | | | | |
| INTERNATIONAL PRODUCT SUPPORT | | | | | |
| PM USA | | | | | |
| PM PI | | | | | |
| PROJECT NATURAL | | | | | |
| INGREDIENTS | | | | | |
| MENTHOL | | | | | |
| REDUCED TAR & NICOTINE INTL | | | | | |
| SELECTIVE FILTRATION | | | | | |
| NEW PACKAGING CONCEPTS | | | | | |
| PROCESS DEV STUDIES | | | | | |
| COMBUSTION RESEARCH | | | | | |
| Mass Burn Control | | | | | |
| Pyrolysis Temp Control | | | | | |
| FLAVORS | | | | | |
| Thermal Flavor Release | | | | | |
| Flavor Formation Studies | | | | | |
| Fragrances | | | | | |
| Volatile Flavors | | | | | |
| AEROSOLS | | | | | |
| Formation Mechanisms | | | | | |
| Short Lived Aerosols | | | | | |
| SELECTIVE SEPARATIONS | | | | | |
| Supercritical Technology | | | | | |
| Membrane Separation | | | | | |
| CONSUMER TESTING RESEARCH | | | | | |
| Regression Based Mod of Lik | | | | | |
| Stochastic Discrimination Mod | | | | | |
| Cost/Benefit Eval | | | | | |
| Quant Mod of Market Dynamics | | | | | |
| CHEMICAL SENSES | | | | | |
| Electrophysiological Stud | | | | | |
| Trigeminal Stud | | | | | |
| Odor Panel | | | | | |
| Room Odor Panel | | | | | |
| Flav Response/ Chm Aspects | | | | | |
| Struct-Act Relationships | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | |
| Process Control Sys | | | | | |
| BIOLOGICAL | | | | | |
| Bioconversion | | | | | |
| Antibodies | | | | | |
| Biosensors | | | | | |
| COMPUTING SYSTEMS | | | | | |
| Expert Sys & Neural Net | | | | | |
| Optical Computing | | | | | |
| BASIC ANALYTICAL RESEARCH | | | | | |
| New Project 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| New Project 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| New Project 3 | | | | | |
| New Project 4 | | | | | |
| New Project 5 | | | | | |
| Total Support | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 |
| Total Direct | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Direct & Support | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 |
| Allocated Total | 11.00 | | | | |

2026230670

| | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------------------------|-------|-------|-------|-------|-------|
| TOBFUN9195R.W20 | | | | | |
| OPERATIONS SUPPORT | | | | | |
| Adhesives: | | | | | |
| Cigarette Monitoring | | | | | |
| Materials Evaluation | | | | | |
| Customer Complaints-T/O/S | | | | | |
| Flavor Dev/Analytical Sup | | | | | |
| Marlboro Standardization | | | | | |
| Alt Humectants/Preserv | | | | | |
| Micro Quality Improv | | | | | |
| Monogram Inks | | | | | |
| Packaging - Inks & Solvents | | | | | |
| Semiworks Support | | | | | |
| Burley Spray/Dry Flavors | | | | | |
| Flavor Specs/Certs | | | | | |
| ETS Studies | | | | | |
| Entomological Support | | | | | |
| Project Warhol | | | | | |
| Engineering Stud/Methods | | | | | |
| Recon Sheet Certification | | | | | |
| Cooperative Leaf Studies | | | | | |
| Environmental Issues | | 1.50 | 2.00 | 2.50 | 2.50 |
| PROJECT TOMORROW | | 1.00 | 2.00 | 3.50 | 3.50 |
| OPTICAL PROCESSING | | | | | |
| NEW EXPANSION PROCESS | 11.70 | 8.20 | 6.20 | 4.20 | 4.20 |
| CAST LEAF RCB PROCESS | | | | | |
| PROJECT ART | | | | | |
| Art Sup of Current proc | | | | | |
| Art Process Development | | | | | |
| Art Total | | | | | |
| PROJECT BETA | 3.3 | 3.30 | 3.30 | 3.30 | 3.30 |
| PROJECT SIGMA | | | | | |
| TSNA | | | | | |
| LBA | | | | | |
| REDUCED SS/PAPER TECH | | | | | |
| PROJECT AMBROSIA/ASH TRAY ODOR | | | | | |
| PROJECT PACT | | | | | |
| LOW TAR/HIGH FLAVOR | | | | | |
| FILTER RESEARCH | | | | | |
| Domestic | | | | | |
| International | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | | 1.00 | 1.50 | 1.50 | 1.50 |
| INTERNATIONAL PRODUCT SUPPORT | | | | | |
| PM USA | | | | | |
| PM FI | | | | | |
| PROJECT NATURAL | | | | | |
| INGREDIENTS | | | | | |
| MENTHOL | | | | | |
| REDUCED TAR & NICOTINE INTL | | | | | |
| SELECTIVE FILTRATION | | | | | |
| NEW PACKAGING CONCEPTS | | | | | |
| PROCESS DEV STUDIES | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| COMBUSTION RESEARCH | | | | | |
| Mass Burn Control | | | | | |
| Pyrolysis Temp Control | | | | | |
| FLAVORS | | | | | |
| Thermal Flavor Release | | | | | |
| Flavor Formation Studies | | | | | |
| Fragrances | | | | | |
| Volatile Flavors | | | | | |
| AEROSOLS | | | | | |
| Formation Mechanisms | | | | | |
| Short Lived Aerosols | | | | | |
| SELECTIVE SEPARATIONS | | | | | |
| Supercritical Technology | | | | | |
| Membrane Separation | | | | | |
| CONSUMER TESTING RESEARCH | | | | | |
| Regression Based Mod of Lix | | | | | |
| Stochastic Discrimination Mod | | | | | |
| Cost/Benefit Eval | | | | | |
| Quant Mod of Market Dynamics | | | | | |
| CHEMICAL SENSES | | | | | |
| Electrophysiological Stud | | | | | |
| Trigeminal Stud | | | | | |
| Odor Panel | | | | | |
| Room Odor Panel | | | | | |
| Flav Response/ Chm Aspects | | | | | |
| Struct-Act Relationships | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | |
| Process Control Sys | | | | | |
| BIOLOGICAL | | | | | |
| Bioconversion | | | | | |
| Antibodies | | | | | |
| Biosensors | | | | | |
| COMPUTING SYSTEMS | | | | | |
| Expert Sys & Neural Net | | | | | |
| Optical Computing | | | | | |
| BASIC ANALYTICAL RESEARCH | | | | | |
| New Project 1 | | | | | |
| New Project 2 | | | | | |
| New Project 3 | | | | | |
| New Project 4 | | | | | |
| New Project 5 | | | | | |
| Total Support | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Direct | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| Total Direct & Support | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| Allocated Total | 15.00 | | | | |

2026230671

| TOBMATL91915.W20 | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------------------------|-------|-------|-------|-------|-------|
| OPERATIONS SUPPORT | | | | | |
| Adhesives | | | | | |
| Cigarette Monitoring | | | | | |
| Materials Evaluation | | | | | |
| Customer Complaints-T/O/S | | | | | |
| Flavor Dev/Analytical Sup | | | | | |
| Marlboro Standardization | | | | | |
| Alt Humectants/Preserv | | | | | |
| Micro Quality Improv | | | | | |
| Monogram Inks | | | | | |
| Packaging - Inks & Solvents | | | | | |
| Semiworks Support | | | | | |
| Burley Spray/Dry Flavors | | | | | |
| Flavor Specs/Certs | | | | | |
| ETS Studies | | | | | |
| Entomological Support | | | | | |
| Project Warhol | | | | | |
| Engineering Stud/Methods | | | | | |
| Recon Sheet Certification | | | | | |
| Cooperative Leaf Studies | | | | | |
| Environmental Issues | | | 1.00 | 2.00 | 2.00 |
| PROJECT TOMORROW | | | | | |
| OPTICAL PROCESSING | | | | | |
| NEW EXPANSION PROCESS | 7.00 | 4.00 | 3.00 | 1.00 | 0.00 |
| CAST SHEET RCB PROCESS | 8.40 | 15.60 | 14.00 | 11.20 | 10.50 |
| PROJECT ART | | | | | |
| Art Sup of Current proc | 3.20 | 0.50 | 0.50 | 0.00 | 0.00 |
| Art Process Development | 9.00 | 10.00 | 10.00 | 9.00 | 4.00 |
| Art Total | | | | | |
| PROJECT BETA | | | | | |
| PROJECT SIGMA | | | | | |
| TSNA | | | | | |
| LBA | | | | | |
| REDUCED SS/PAPER TECH | | | | | |
| PROJECT AMBROSIA/ASH TRAY ODOR | | | | | |
| PROJECT PACT | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| LOW TAR/HIGH FLAVOR | 0.50 | | | | |
| FILTER RESEARCH | | | | | |
| Domestic | | | | | |
| International | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| INTERNATIONAL PRODUCT SUPPORT | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PM USA | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| PM PI | | | | | |
| PROJECT NATURAL | | | | | |
| INGREDIENTS | | | | | |
| MENTHOL | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| REDUCED TAR & NICOTINE INTL | | | | | |
| SELECTIVE FILTRATION | | | | | |
| NEW PACKAGING CONCEPTS | | | | | |
| PROCESS DEV STUDIES | | | | | |
| COMBUSTION RESEARCH | | | | | |
| Mass Burn Control | | | | | |
| Pyrolysis Temp Control | | | | | |
| FLAVORS | | | | | |
| Thermal Flavor Release | | | | | |
| Flavor Formation Studies | | | | | |
| Fragrances | | | | | |
| Volatile Flavors | | | | | |
| AEROSOLS | | | | | |
| Formation Mechanisms | | | | | |
| Short Lived Aerosols | | | | | |
| SELECTIVE SEPARATIONS | | | | | |
| Supercritical Technology | | | 1.50 | 5.00 | 8.00 |
| Membrane Separation | | | | 1.00 | 4.00 |
| CONSUMER TESTING RESEARCH | | | | | |
| Regression Based Mod of Lik | | | | | |
| Stochastic Discrimination Mod | | | | | |
| Cost/Benefit Eval | | | | | |
| Quant Mod of Market Dynamics | | | | | |
| CHEMICAL SENSES | | | | | |
| Electrophysiological Stud | | | | | |
| Trigeminal Stud | | | | | |
| Odor Panel | | | | | |
| Room Odor Panel | | | | | |
| Flav Response/ Chm Aspects | | | | | |
| Struct-Act Relationships | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | |
| Process Control Sys | | | | | |
| BIOLOGICAL | | | | | |
| Bioconversion | | | | | |
| Antibodies | | | | | |
| Biosensors | | | | | |
| COMPUTING SYSTEMS | | | | | |
| Expert Sys & Neural Net | | | | | |
| Optical Computing | | | | | |
| BASIC ANALYTICAL RESEARCH | | | | | |
| New Project 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| New Project 2 | | | | | |
| New Project 3 | | | | | |
| Primary Improvement Program | 4.00 | 3.00 | 2.00 | 2.30 | 3.00 |
| Reconstitution Plant Support | 2.90 | 1.90 | 3.00 | 4.50 | 4.50 |
| Total Support | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Direct | 38.00 | 38.00 | 38.00 | 38.00 | 38.00 |
| Total Direct & Support | 38.00 | 38.00 | 38.00 | 38.00 | 38.00 |
| Allocated Total | 38.00 | | | | |

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| | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------------------------------|-------|-------|-------|-------|-------|
| TOBPF919SR.W201 | | | | | |
| OPERATIONS SUPPORT | | | | | |
| Adhesives | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 |
| Cigarette Monitoring | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Materials Evaluation | 1.20 | 1.20 | 1.20 | 1.20 | 1.20 |
| Customer Complaints-T/O/S | | | | | |
| Flavor Dev/Analytical Sup | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 |
| Marlboro Standardization | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| Alt Humectants/Preserv | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| Micro Quality Improv | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Monogram Inks | | | | | |
| Packaging - Inks & Solvents | | | | | |
| Semiworks Support | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| Burley Spray/Dry Flavors | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| Flavor Specs/Certs | | | | | |
| ETS Studies | | | | | |
| Entomological Support | | | | | |
| Project Warhol | | | | | |
| Engineering Stud/Methods | | | | | |
| Recon Sheet Certification | | | | | |
| Cooperative Leaf Studies | | | | | |
| Environmental Issues | 0.10 | 0.25 | 0.75 | 0.75 | 0.75 |
| PROJECT TOMORROW | 2.00 | 1.00 | 0.75 | 0.75 | 0.75 |
| OPTICAL PROCESSING | 0.15 | 0.30 | 0.30 | 0.30 | 0.30 |
| NEW EXPANSION PROCESS | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 |
| CAST LEAF RCB PROCESS | 1.00 | 0.85 | 0.85 | 0.85 | 0.85 |
| PROJECT ART | | | | | |
| Art Sup of Current proc | 8.70 | 7.50 | 5.70 | 5.70 | 5.70 |
| Art Process Development | | | | | |
| Art Total | | | | | |
| PROJECT BETA | | | | | |
| PROJECT SIGMA | 0.90 | 0.80 | 0.70 | 0.70 | 0.70 |
| TSNA | | | | | |
| LBA | | | | | |
| REDUCED SS/PAPER TECH | 2.95 | 2.90 | 2.00 | 2.00 | 1.00 |
| PROJECT AMBROSIA/ASH TRAY ODOR | 0.20 | 0.30 | 0.40 | 0.40 | 0.40 |
| PROJECT PACT | | | | | |
| LOW TAR/HIGH FLAVOR | 0.80 | 0.90 | 1.90 | 1.90 | 1.90 |
| FILTER RESEARCH | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Domestic | 0.50 | 0.70 | 0.70 | 0.70 | 0.70 |
| International | | | | | |
| DOMESTIC PRODUCT DEVELOPMENT | 9.80 | 10.80 | 10.80 | 10.80 | 10.80 |
| INTERNATIONAL PRODUCT SUPPORT | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PM USA | 8.80 | 9.80 | 11.80 | 11.80 | 12.80 |
| PM PI | | | | | |
| PROJECT NATURAL | 0.80 | 0.60 | 0.70 | 0.70 | 0.70 |
| INGREDIENTS | | | | | |
| MENTHOL | | | | | |
| REDUCED TAR & NICOTINE INTL | 0.50 | 0.50 | 0.60 | 0.60 | 0.60 |
| SELECTIVE FILTRATION | | | | | |
| NEW PACKAGING CONCEPTS | | | | | |
| PROCESS DEV STUDIES | 0.90 | 0.90 | 1.15 | 1.15 | 1.15 |
| COMBUSTION RESEARCH | | | | | |
| Mass Burn Control | | | | | |
| Pyrolysis Temp Control | | | | | |
| FLAVORS | | | | | |
| Thermal Flavor Release | | | | | |
| Flavor Formation Studies | | | | | |
| Fragrances | | | | | |
| Volatile Flavors | | | | | |
| AEROSOLS | | | | | |
| Formation Mechanisms | | | | | |
| Short Lived Aerosols | | | | | |
| SELECTIVE SEPARATIONS | | | | | |
| Supercritical Technology | | | | | |
| Membrane Separation | | | | | |
| CONSUMER TESTING RESEARCH | | | | | |
| Regression Based Mod of Lix | | | | | |
| Stochastic Discrimination Mod | | | | | |
| Cost/Benefit Eval | | | | | |
| Quant Mod of Market Dynamics | | | | | |
| CHEMICAL SENSES | | | | | |
| Electrophysiological Stud | | | | | |
| Trigeminal Stud | | | | | |
| Odor Panel | | | | | |
| Room Odor Panel | | | | | |
| Flav Response/ Chm Aspects | | | | | |
| Struct-Act Relationships | | | | | |
| MEAS & SENS OF PHY & CHM CHAR | | | | | |
| Process Control Sys | | | | | |
| BIOLOGICAL | | | | | |
| Bioconversion | | | | | |
| Antibodies | | | | | |
| Biosensors | | | | | |
| COMPUTING SYSTEMS | | | | | |
| Expert Sys & Neural Net | | | | | |
| Optical Computing | | | | | |
| BASIC ANALYTICAL RESEARCH | | | | | |
| New Project 1 | | | | | |
| New Project 2 | | | | | |
| New Project 3 | | | | | |
| New Project 4 | | | | | |
| New Project 5 | | | | | |
| Total Support | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Direct | 59.00 | 59.00 | 59.00 | 59.00 | 59.00 |
| Total Direct & Support | 59.00 | 59.00 | 59.00 | 59.00 | 59.00 |
| Allocated Total | 59.00 | | | | |

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APPENDIX P

Action Plans/Recommendations

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Action Plans/Recommendations on various internal issues and future factors have been developed for review and discussion:

1. Strategic Technology Selection, Development, and Review.
 - Involves an extension of our current process and focuses on technologies which may go beyond the direct control of the program coordinator, long-term are longer term and involve total utilization of technical staff in technology evaluation, implementation and review.
2. Support of Science Education
 - Addresses the need to foster the development of quality science education programs to ensure an adequate pool of skilled workers that will meet future company needs.
3. Recruiting
 - Discusses our current position with regard to recruiting and suggests additional strategies which may change the process to one that is more opportunistic rather than reactive.
4. Training
 - Outlines a number of key areas which will increase the awareness of the R&D staff (cross-functional training) and enhance the consistency of the work product (data analysis) and effectiveness of the management of the work processes (project planning).
5. Facility Plan
 - Head count projections, organizational changes, as well as the implementation of new technologies and workplace regulations will necessitate changes to R&D facilities. A facility plan is under development and progress is summarized.

STRATEGIC TECHNOLOGY SELECTION, DEVELOPMENT, AND REVIEW

The Strategic Technology List (Appendix E) is intended as an aid to the selection and development of technologies in support of our major programs. Since R&D resources cannot support all of these items, decisions between them must be made. Feasibility, timeliness and

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resource availability must be considered. By and large, this function is handled efficiently by the managers and program coordinators. Three areas where the process might be improved are:

1. The development of strategic science and technology items which require resources beyond the direct control of the program coordinator. These may require facilities or expertise from other programs, divisions or directorates or from external sources. Negotiation for work on such items is often delayed in cases where their development is necessary to the long-term objectives of the program, but not to the immediate goals.
2. The identification and utilization of existing R&D expertise for the evaluation of new science or technology areas.
3. The planning, initiation and review of basic research in support of long-term needs. In the face of specific immediate needs, it is difficult for a program coordinator or manager to justify the diversion of resources to basic investigations--no matter how promising these may seem in the long run. Thorough studies of the feasibility of timely contributions to program objectives are, themselves, resource consuming. Moreover, cost effective basic research may need to be structured to support several programs.

Action Plan: Strategic Science and Technology Identification, Development and Utilization.

To deal more efficiently with areas one and two, we recommend the establishment of an "R&D Technology Taskforce" This group would be chartered to:

- Obtain careful evaluations of the potential of selected areas of science or technology to contribute to R&D objectives.
- Promote the establishment of internal technology monitoring activities in the selected areas.
- Recommend appropriate development activities, which might range from evaluating commercial products to sponsoring external research or establishing an internal program.
- Provide continuing support for all activities initiated up to and including the implementation of developed technologies.

Areas to be evaluated would be selected in collaboration with the Managers and Program Coordinators. Unless requested by the Coordinators or Managers to do otherwise, the Task

Force would confine its efforts to forward-looking technology evaluations and would not review the objectives or progress of ongoing programs.

The Task Force would consist of the Principal and Associate Principal Scientists and Engineers as well as additional members of the technical staff as required to ensure that the best internal expertise is applied to each area evaluated. Personnel from the programs involved would be included in all phases of the evaluation and recommendation process.

In reviewing a science or technology area, the Task Force would take full advantage of available literature and of internal expertise. Whenever possible members of the R&D staff would be asked to prepare and present summaries and recommendations. However the Task Force would be encouraged to use external consultants when necessary to make quality recommendations in a timely manner.

The preliminary recommendations of the Task Force would be discussed with the appropriate Managers and Program Coordinators before presentation to the Directors, Research Fellow and Vice Presidents. Final recommendations would be made at R&D Planning Meetings.

Action Plan: Program Review Process

The ability to explore new areas and concepts is a vital component of the R&D process which should not be unduly hampered. Thus the professional staff should be encouraged to pursue limited exploratory activities with a minimum of administrative detail. However, careful review of activities should occur on a regular basis. Thus it is recommended that formal review procedures be established for the initiation of new programs and for the continuation of existing programs.

For a new program or activity, the procedure would be initiated by the preparation of a proposal containing the following elements:

1. Review of the areas of science and/or technology involved.
2. Definition of objectives in terms of potential (a) business (product or process) contributions and/or (b) fundamental or applied knowledge of value to other programs.
3. Discussion of the technical approaches (tactics) to be employed to reach the above objectives. Major technical roadblocks should be identified and the probability of overcoming them assessed.

4. A review of existing internal and external expertise which might be applied to the program.
5. A projection of the resources required and the anticipated times to reach specified objectives.

Upon consideration and acceptance of the proposal, R&D management would obligate resources to it for a specified time period at the end of which the proposal and review process would be repeated. The proposal would be updated to include progress at PM and elsewhere and the acceptance criteria would include assessment of current resource and business needs. A specified time for the next review would be set and would be dependent on the nature of the program and the resources allocated for it.

It is recommended that R&D management and senior staff participate in the proposal/review process.

SUPPORTING SCIENCE EDUCATION

R&D's involvement in the areas of education and contributions should be part of the overall strategy for this plan period. The corporate philosophy and strategy for contributions will be addressed first. In a memorandum from Mr. Hamish Maxwell to Mr. Jack Nelson, dated February 2, 1990, a new initiative was developed to address issues surrounding the corporate contributions program. The highlights of this new initiative can be summarized into one of Focused Giving. Focused Giving was established to encompass three themes:

1. Education with special focus on the preparedness of the future work force;
2. Hunger and nutrition; and
3. Culture.

A portion of the total budget will be set aside for Focused Giving grants. It is readily apparent that all of R&D's contributions should be centered on the first theme; i.e., education with special focus on preparedness of the future work force. In global terms, the future work force could be members of our current staff, students at the college and post graduate level who are likely candidates to join us in the near future, and students below college level that will serve as the feeder group for higher education.

This department has had sustained contributions for the Virginia Academy and Junior Academy of Science and Project SEED of the American Chemical Society. Both of these programs have benefitted the high school students. Most recently we have embarked upon

graduate fellowships in chemistry at UVa and a graduate fellowship in physics at VPI. The purpose of these two fellowships was to establish a firmer relationship between R&D scientists and these two institutions of higher learning within the Commonwealth. Most other R&D contributions are focused toward a desired goal. In the cases previously cited, donations of money made through Corporate Contributions is to sustain activities in science and mathematics.

In addition to money, we contribute limited internal resources to such activities as conducting laboratory tours or presentations in the lecture hall. It is difficult to measure the worth of such tours. Mentor-student relationships with summer students may be a more effective means for increasing the future pool of employees for R&D. On previous occasions members of the department have conducted advanced chemistry classes for teachers in the Richmond Public schools. There are probably other efforts which have been directed toward contributions or in-kind services in the past, but we have never really established a concerted program for such activities. R&D shared devoting a certain portion of scientists' time in using their talents to assist in instruction of teachers and/or students at the high school, middle school and elementary school level in the Richmond community. Part of the focus of R&D ought to be in the "adopt a school programs". We have been responsible in honoring requests for R&D employees to visit schools to talk about scientific careers, but we need to be more overt in making our presence know in the science and math class rooms in the Richmond area. It would be beneficial to provide Summer Fellowships to outstanding local teachers to work in the R&D laboratories to update knowledge as well as augment their salaries. It should be clearly understood that these positions would not lead to full-time R&D employment. Hiring teachers in the local community to work full time in the laboratory would be detrimental to science education.

It is difficult to separate education support from contributions. In one case we are contributing time and talent toward enhancement of education whereas in other case we are using education as the vehicle to enhance contributions at the corporate level. We must continue to broaden the scientific education of our current staff through the judicious use of tuition refund, sabbaticals, and management directed scientific pursuits. In the latter context, an example involves the work of Gordon Bokelman on Cell Wall Research following R&D's management's decision to send him to Colorado State for such training. Part of our strategy for education for the current work force would be that every member of the department, regardless of status, be encouraged to attend at least one course of learning each year they are employed. This would require more rigorous involvement between R&D administration and the local and state school boards to facilitate such strength. Some of which could even be conducted on site. For example, through the advances in telecommunication, several advanced science and mathematics instruction can be conducted in our conference rooms and/or lecture hall. We have worked with Dr. Thomas Haas at VCU on master's degree programs in engineering.

The essential thrust of this program ought to result in a more overt effort to alleviate some of the existing problems which are currently plaguing science and math education in this

country. Although individual staff members are contributing to their local communities, this department needs to become more visible in local and state scientific activities. Any effort expended by members of the staff in enhancement of science education will certainly result in longer delays in completion of the focused goals of the department. However, this time devoted to establishing the bridge between our department and local and state authorities is and/or should be part of R&D's charter. Without a commitment on the part of senior management, the individual staff members are probably not going to be as effective as they could or should in this worthwhile pursuit. Most major corporations in this country, at this point in time, have developed rigorous programs in their satellite operations in various cities in this country. It is almost impossible to pick up a scientific magazine currently without some mention of what the corporation is doing or has done to ameliorate the problems dealing with increased interest in math and science in their local communities. There are numerous programs available at the national level in almost every scientific society that we could or should be using to sustain our commitment to science and education.

We have a Continuing Fellowship Committee for sabbaticals, a Technology Assessment Group, and a Technical Seminar Committee in the department. It seems appropriate within the confines of the Strategic Plan that we establish a committee on contributions and education for the department whose responsibility would be to establish a coherent program of what Philip Morris USA R&D ought to be doing to enhance the quality of education. There are numerous role model companies such as Dow, Amoco, and General Electric that would be worth on site discussions with our appointed committee. We must recognize that to do this job properly it is going to be a sustained effort which reaches far beyond the Five-Year Strategic Plan period of time. Although some of our current efforts are worthy of our sustained interest and commitment, it would be ill advised to spend a large amount of time and energy in a one to two-year commitment at the local level to satisfy this need. We must make the commitment to use our internal resources of personnel time and budgeted monies to address this concern.

RECURITING

Hiring in R&D (at the professional level) is almost exclusively reactive; that is, we lose a person and then we generate specifications to replace them. We then utilize the Employment Department to generate ads, utilize agencies and to follow up on leads given to them by the hiring management. There is no "hiring plan" to bring in a number of entry level persons on a regular basis. For the past 2-3 years, we have utilized Summer Intern positions as a means for keeping campus contacts for entry level persons. We have designated that all of these positions be filled with minority candidates. We have tried to utilize departments in schools that we feel produce students that we would want to hire. The students we have gotten under this philosophy have been good and we have had some of the students return as they have gone on to pursue advanced degrees (no hires thus far). The overall objective has been to establish a relationship on campus so that when we needed entry level persons we would not be a "new face" on campus,

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but an established one. Then we could look to hire an intern or hope that the faculty could lead us to viable candidates. This would also mean that they might send candidates our way "out of the scheduled" time frame and we would want to respond positively to that also.

The same basic principles could be utilized for higher level personnel by:

- carefully targeting acceptable programs
- maintaining on-going contacts and providing work opportunities
- hiring a portion of the personnel
- stating up front a commitment to minorities/females
- involving R&D personnel in the management of this process

TRAINING

Cross-Functional Training: The internal situational analysis identified the need for increasing R&D employee's knowledge of tobacco processing and cigarette manufacturing operations. An existing program provides selected bench scientists with this knowledge through 4-6 month assignments in the Semiworks and Process Development Pilot Plants. Even though this program has been successful, it involves only two people per year and has a limited overall impact on R&D. A need exists for a short program aimed at providing general processing/manufacturing knowledge to a majority of the R&D professional staff. It is envisioned that this program would be an annual orientation involving a number of selected individuals. The orientation would include tours of all the different processing and manufacturing plants.

Data Analysis/Project Planning: A project conducted during the period May 15-August 15, 1990, by a Visiting Scientist (Dr. W. Wegscheider) involved a critical evaluation of the potential of alternate methods of data analysis to provide correlations between analytical chemical information and other data such as subjective evaluations. The basic approach utilized multivariate analysis concepts. Traditional methodologies such as statistical analysis and partial least squares (PLS) were employed. In addition, newer concepts such as fuzzy logic, neural networks and artificial intelligence were considered. Several past and/or on-going projects were reviewed as candidates for these approaches. Two factors important to the success of projects were found to be related to the following components important to project execution: project planning and expertise and promptness of data analysis. Recommendations include the enhancement of data analysis expertise and knowledge of data quality issues as well as the enhancement of project management skills involving planning and coordination. Standard operating procedures which outline accepted data analysis methods should be developed where needed and readily available project management training and supporting materials should be targeted to key R&D staff.

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FACILITY PLAN

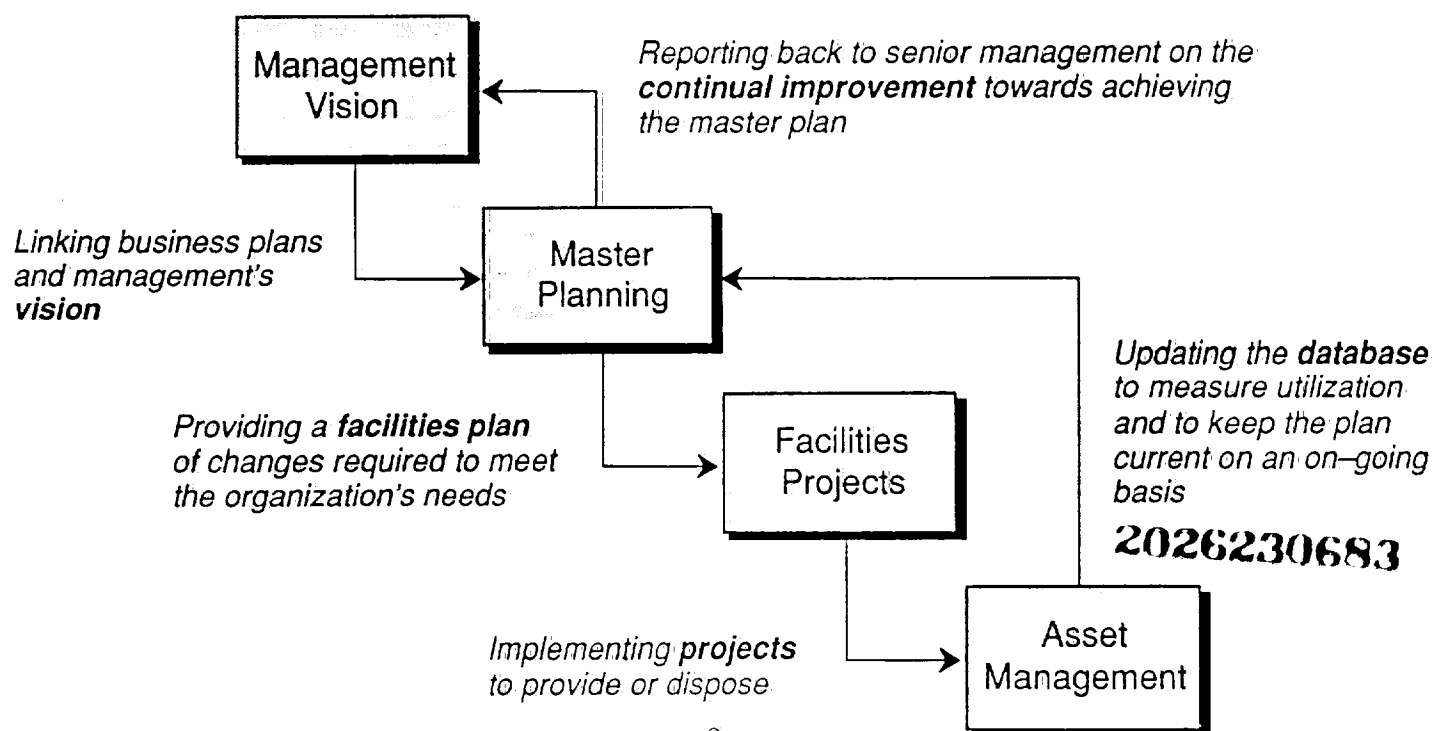
I. INTRODUCTION

Facility master planning is an ongoing process which requires management support, has realistic and feasible projects to implement and one that has a system in place with which to update and measure continual improvement towards achieving the department's and company's mission. A facility master plan is a tool for visualizing the future. It represents a future condition that is better than now exists. If the master plan is to be successful, it must be integrated and linked to the business plan of R&D, as well as the rest of the company. Table I illustrates the process of developing and maintaining a facility master plan.

TABLE I

INTEGRATED MASTER PLANNING PROCESS¹¹

Integrated Master Planning Process



II. FACTORS IMPACTING RESEARCH FACILITIES

According to Jim Richert, Director of R&D facility design at Hellmuth, Obata & Kassabaum, a St. Louis based international facilities consulting firm, "Researchers' facility needs already differ significantly from those twenty, ten or even a few years ago. Several trends signal that the relationships between researchers and their working environments are on the verge of extraordinary change."² In R&D we are experiencing the changes on a daily basis. The increasing cost, complexity and capability of technical instrumentation and the appropriate space and special environmental conditions required to house and maintain them is a constant challenge. Growing concerns about health threats to research personnel and environmental hazards have intensified in recent years as evidenced by the increased number of OSHA standards and guidelines including the most recently published "Chemical Hygiene Plan."³ Over the past five years, research space has been modified in an attempt to provide separate lab areas and work station/desk areas for research personnel. EPA regulations with regard to hazardous chemical disposal, asbestos abatement, waste management and other environmental concerns have continued to escalate in recent years.

Collaborative research programs involving multidisciplinary teams spanning the entire R&D organization have changed the approach for allocation of facility space. The requirement for space to implement new programs on an expedited basis has presented challenges, particularly in the last several years. Available space for special laboratories or pilot plant applications is at a premium. The last remaining area of "undeveloped real estate," the old D1 Semiworks/Primary has been totally cleared to accommodate Project Pack, the modified Smoking Materials Project and a "temporary" laboratory installation for small scale handsheet cast-leaf research. The remainder of space has tentatively been allocated for critical parts inventory and supplies storage for "C" Pilot Plant and the new Cast Sheet Pilot Plant. Laboratory and office space requirements for the personnel currently located on the soon-to-be-demolished C2 Balcony necessitate a major "squeeze play" in order to accommodate the needs. Consolidation of the Paper Program in the O/C, R&D laboratories and Beta project on D2 with concurrent moves of approximately fifty personnel has presented yet another new set of challenges. Several other groups including Analytical Research have specific space requirements which cannot currently be met due to space availability constraints. Space requirements to accommodate new production equipment at the Semiworks will provide challenges in the near future.

All of the factors noted above have signaled the need for a comprehensive review of the current and future requirements of the department with respect to its facilities and whether we will be able to accommodate the new program needs three to five years in the future.

III. THE FACILITY PLAN

It is readily apparent that a proactive plan for the R&D facilities, and one that is closely linked and integrated with the R&D Strategic Plan, must be addressed and developed to move the Department into the future.

The Industrial Engineering Group was requested to assist R&D in developing a Master Facility Plan that would address current, short-term needs and forecast needs five to eight years into the future.

The project, as defined by the industrial engineers assigned to assist R&D, comprises four distinct phases as follows:

Phase I: Space and Program Requirements Analysis

A survey was conducted to collect basic quantifiable space and program needs information. The survey entails a review by major R&D functional area, of current versus forecasted employees, equipment, special laboratory or space needs and service requirements. Information gathered in this phase will serve as the data base from which space-related deficiencies may be addressed, or conversely, space availability opportunities exist to be exploited.

Status: All divisional surveys have been completed. Interviews with R&D managers were conducted in October. Analysis of manager input from the survey results is underway.

Phase II: Develop Conceptual Long-Range Master Facility Plan

Based on results of the space needs analysis, the Industrial Engineers will collaborate with R&D staff to develop a set of feasible overall space utilization alternatives for each of the major R&D buildings, which will achieve the identified long-range research program needs of the Department. Although the major focus of the study is the R&D North Complex, (i.e., the facilities north of Bells Road), assessment is also required of space occupied by R&D staff at the Operations Center and Semiworks to ensure optimal space utilization for the total R&D mission.

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III. THE FACILITY PLAN (Continued)

Phase III: Develop Solutions for Short-Term Space Needs

Using the Master Facility Plan as a road map, the Industrial Engineers will then address specific requests by R&D staff to develop solutions for identified short-term space issues. These include the following:

A. "D" Pilot Plant

Develop a plan for improved design and space utilization of "D" Pilot Plant.

B. North Complex

Address current cubicle versus office availability and laboratory space utilization with special emphasis on needs for the Analytical Research Division.

C. "E" Building

Address logistical problems associated with the Product Evaluation Division's POL mailout operation, including the feasibility of off-site relocation. (This study is well underway by the Industrial Engineering Department.)

D. R&D Semiworks

A study is currently underway to examine the feasibility of relocating the Competitive Testing mailout operation to another off-site location in order to free up space for other critical needs of the semiworks operation.

Phase IV: Project Engineering Assistance/Implementation

Recommendations identified in the study may require the involvement of Project Engineering to spearhead cost estimating, funding and implementation management. Projects which have been tentatively identified for further analysis include areas in D1 North, "D" Pilot Plant and North Complex laboratory/office areas. It is too early to speculate as to what may be specifically required in the way of renovation and construction to meet the near-term (three to five years) and longer-term (five to eight years) needs of the Department.

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Once established, the Master Facility Plan will provide a valuable tool for a more proactive approach for management of the R&D facilities in the future.

References:

1. Parshall, Steven A. et. al, "Beyond the Year 2000...Facility Master Plans Envision the Future," *International Facility Management Association Journal*, October 1989, pp. 8-23.
2. *Federal Register*, Vol 55, No. 21, January 31, 1990, pp. 3300-3335; 29 CFR Part 1910 Subpart Z.
3. Richert, Jim, "Designing for the Future of R&D - Redefining the Laboratory Work Environment," presented at the International Facility Management Association R&D Council Spring Meeting, Pittsburgh, PA, June 1990.

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APPENDIX Q

Objective and Strategies of Major Programs

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ART PROGRAM

Objective

Develop a family of subjectively acceptable low and ultra-low tar, regular and menthol products from filler which has had approximately 97% of its nicotine extracted with supercritical CO₂.

Strategies

1. Determine optimum blend and process conditions to meet the extraction goal under commercially feasible conditions with the best subjective character.
2. Development of casing, aftercut and menthol systems which compliment the subjective attributes of de-nicotinized filler.
3. Determine the optimum nicotine delivery at a given tar level which offers the most acceptable subjective presentation.
4. Develop second-generation process using liquid column absorber technology to replace stems as the absorber material.
5. Support of Low Tar/High Flavor program.
6. To evaluate and develop process modifications for the utilization of ART process by-product tobaccos.

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PROJECT BETA

(SEE APPENDIX A)

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Domestic Product Development

Objective:

To develop new cigarette products for PM USA which will contribute to volume growth in the USA market.

Strategies:

1. To provide support for the development of cigarette products which utilize new or emerging technologies to offer product advantages to the consumer.
 - Bold
 - Ambrosia
 - Low Sidestream
2. To develop cigarette products for new product introductions which satisfy our business objectives of income, volume and market share.
3. Maintain and/or enhance the subjective, analytical and physical performance of existing products in the marketplace, in a manner which addresses issues relating to capacity, quality and productivity.

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FILTRATION RESEARCH

Objective

Provide filtration research support for the development of new and/or improved products.

Strategies

1. Develop new or unique filtration system.
2. Support new product development.
3. Support the existing business through:
 - a. Product uniformity improvements
 - b. Cost reductions
 - c. Alternative materials.

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International Product Support

Objective:

To develop new cigarette products for PM International markets which will contribute to volume growth worldwide.

Strategies:

1. To develop new cigarette products that meet PMI management's planned product introductions, to include key markets for USA export products and those markets supported by locally manufactured products.
2. Develop new cigarette products in anticipation of international consumer trends and/or providing a marketing advantage.
 - Alternative filter configurations (concentrics, fluted, SCS)
 - Low Sidestream
 - Art
 - Half Nic
 - Menthol
 - Ultra Low Tar
 - Ambrosia
 - Superslims
 - Price/Value
3. Maintain and/or enhance the subjective, analytical and physical performance of existing products in the marketplace.
4. Continue to improve understanding of international markets through the following:
 - Interpretation of market sales data and demographics.
 - Initiation of switching and tracking studies.
 - Improve understanding of individual markets in order to develop optimal blends, flavors, filter systems and delivery levels.

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- Initiation of research programs to identify the perceived product benefits most viable in international markets.
- Interface with PMI operations, marketing and sales personnel.

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OPERATIONS SUPPORT

Objective

The operations support program provides resources from across the entire department to support a wide range of technology needs for the current business of PM USA. In each program, the goal is to provide timely resources and also to monitor technology transfer. When appropriate, training activities are provided so that ongoing needs can be taken over by appropriate departments.

Strategies

Adhesives

1. Obtained signed agreements with all vendors.
2. Assign personnel and equipment to develop standards in cooperation with Purchasing.
3. Issue standards and work with vendors to insure compliance.

Cigarette Monitoring

1. Monitor all new brand production.

Materials Evaluation

1. Obtain management support for redefined program and allocate resources.
2. Prioritize indirect materials.
3. Initiate improved database.
4. Remove inappropriate materials from PM inventory.

Customer Complaints

1. Rapidly investigate and report on samples submitted.

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Flavor Development/Analytical Studies

1. Set priorities for maximum product benefit.
2. Allocate appropriate resources.

Marlboro Standardization

1. Continue to monitor all aspects of quality and uniformity of Marlboro.
2. Analyze database, interpret trends and make recommendations.

Alternate Humectants/Preservatives

1. Identify materials which meet performance criteria in the laboratory.
2. Demonstrate acceptable performance in a manufacturing setting.

Microbiological Quality Improvement

1. Identify critical issues for microbiological improvement.
2. Systematically investigate agreed on issues.
3. Follow up on recommendations with appropriate operations staff to insure new technologies are functional in a manufacturing environment.

Monogram Inks

1. Complete and document priority study.

Packaging Inks and Solvents

1. Provide information needed to comply to all regulations regarding packaging.
2. Assist in developing new packaging technologies with respect to printing.
3. Insure requested support has a high priority.

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Semiworks Support

1. Provide staff and equipment for timely completion of ongoing support for priority projects.

Burley Spray/Dry Flavors

1. Complete and document ongoing study.
2. Implement improved dry flavor system.

Flavor Specifications/Certification

1. Complete export certification.
2. Document and transfer certification to Flavor Center by 11/1/90.
3. Complete flavor specifications.
4. Document and transfer to Q.A.
5. Provide ongoing specifications capability.

ETS Studies

1. Discontinue active research.
2. Monitor literature and provide support for PACT.

Entomological Support

1. Implement Kabat® IGR application as centerpiece of integrated pest control.
2. Develop new technology for integrated pest control.

Project Warhol

1. Complete report and make recommendations.

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Engineering Studies/Methods

1. Participate in study design and identify critical analytical issues to be resolved.
2. Develop methods and obtain data.
3. Assist in statistical evaluation of results.

Recon. Sheet Certification

1. Document analytical methods for certification.
2. Train Q.A. staff and transfer technology.

Cooperative Leaf Studies

1. Provide continuing support to key studies sponsored by Leaf Department.

Environmental Issues

1. Maintain contacts with E.E.P. and monitor environmental literature.
2. Obtain equipment and methods needed for priority issues identified by R&D and E.E.P.
3. Develop new technology to address environmental issues in proactive manner.

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PAPER TECHNOLOGY/REDUCED SIDESTREAM

Objectives

1. To design cigarette papers which will significantly reduce sidestream visibility, odor and irritation without adversely impacting subjectives by 1995 (Reduced Sidestream).
2. To assist in the development and application of flavor-release compounds on cigarette paper in order to develop products with modified sidestream smoke aroma (Project Ambrosia).
3. Develop web materials which have the subjective properties of CA and the filtration properties of paper (Web Filters).
4. To develop procedures for the application of transverse bands to cigarette paper in order to control burn rate (Project Tomorrow).
5. To design a cigarette paper which will control ash flaking on ultra low delivery cigarettes (Marlboro Ultra Lights, Bold) (Papers to Control Ash Flaking).
6. Modify cork-on-white tipping to eliminate filter flare-up through the use of defined levels of low silicate inks (Tipping Papers).
7. Modify white tipping papers to improve lip release properties (Tipping Papers).

Strategies

1. Optimize 45 g/m² calcium carbonate Superslims outer wrap through selection of type and level of fluxing agent(s) to give 70+% sidestream reduction and improved subjectives.
2. Develop single wrap for Superslims which will maintain parity with current double wrapped model with respect to sidestream reduction and subjectives.
3. Optimize 45 g/m² calcium carbonate paper for a full circumference product through the selection of type and level of fluxing agent(s) to give at least 70% sidestream reduction without any sacrifice in subjectives.

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4. To develop low sidestream papers based on crystalline forms of magnesium carbonate or mixed magnesium carbonates including magnesite, hydromagnesite, and iitelite.
5. To develop low sidestream papers based on amorphous forms of magnesium carbonate (sol-gel process) using material which can be scaled-up to produce commercial quantities.
6. To carry out studies designed to elucidate the mechanism by which magnesium carbonates and mixed magnesium carbonates achieve sidestream visibility reduction.
7. To utilize analysis of mainstream smoke, with emphasis on gas phase, to determine smoke chemistry differences between normal and reduced sidestream models in order to design filters which will result in improved subjectives.
8. To develop unique, cigarette compatible catalyst systems which will result in more complete conversion of sidestream gas phase into carbon oxides in order to reduce odor and irritation.
9. Develop optimum methods for application of flavor-release compounds on to cigarette paper.
10. Assist with the commercial development of promising flavor-release compounds.
11. Develop the requisite chemistry to covalently bind flavor molecules to either cellulose or starch in order to be able to make paper with inherent flavor-release properties.
12. Optimize paper made from a furnish consisting of a mixture of cellulose and cellulose acetate.
13. Develop techniques for the partial acetylation of cellulose pulp which can be used to make paper appropriate for filter making.
14. Assist the Filter Development Program with the development of novel papers for filters which would be proprietary to PM.
15. Design and construct a prototype paper making machine with a dandy roll which will allow the application of a cellulosic slurry to paper while on the Fourdrinier wire.

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16. Explore the application of bands of burn retardant chemicals to cigarette paper using either rotogravure or ink jet printing techniques.
17. Determine the feasibility of forming dense bands on paper through a wet calendering process.
18. Assist with the modification of a Max-S tipper which would be able to affix bands of dense paper at regular intervals to cigarette paper.
19. Obtain machine made paper with increased basis weight, and an increased amount of high surface area calcium carbonate. Optimize level of burn additive to obtain satisfactory ash and desired puff count.
20. Work with Technical Services and Purchasing to qualify the modified tipping paper, and develop appropriate QA tests with Analytical Research Division and Incoming Materials QA.
21. Evaluate tipping papers with increased levels of nitrocellulose.
22. Investigate the use of film formers (PVA, CMC, etc.) to "hold out" the nitrocellulose from the tipping paper.

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PROJECT TOMORROW

Objective

To evaluate the feasibility of developing an ignition-propensity test for cigarettes and to evaluate the technical and commercial feasibility of making cigarettes with reduced ignition propensities with respect to such a test.

Strategies

1. Evaluate the feasibility of developing a test for cigarette ignition propensities and determine if cigarette design parameters influence their ignition propensities in such a test.
2. Develop a computer model of cigarette/substrate ignition.
3. Design selected types of cigarettes at reduced mass burn rates, while maintaining consumer-acceptable delivery, physical, and subjective properties to the greatest extent possible.
4. Explore new technologies which may lead to more fire-safe cigarettes.

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OPTICAL PROCESSING

Objective

Develop automated vision systems specifically tailored to the applications of PM USA for the improvement of product quality and manufacturing efficiency.

Strategies

1. Develop and implement product inspection systems to aid in the achievement of Manufacturing's targeted reductions in defect rates by both rejecting defective product and by providing the output needed for the optimization of the manufacturing process.
2. Develop and implement material inspection systems to provide a more reliable and efficient means of guaranteeing the conformity of materials to PM specifications. Provide the inspection capability needed to permit a shift in the responsibility for inspection toward the materials vendor.
3. Develop and apply new inspection algorithms and hardware to
 - a. maintain a competitive advantage within the tobacco industry
 - b. provide alternative hardware suppliers for installed systems
 - c. permit the extension of the use of automated vision to increasingly varied and complex inspection problems.

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LOW TAR/HIGH FLAVOR

Objective

To develop ultra-low tar and/or reduced nicotine cigarettes equal subjectively to cigarettes with at least twice the tar and/or nicotine utilizing conventional technology and, as appropriate, technological advances from other programs, particularly those proprietary PM technologies such as ART which may provide a competitive marketing edge for the Company.

Strategies

1. Develop 2 and 6 mg cigarettes with enhanced total subjective character.
2. "Ultima" -- Develop ultralow tar (1-3 mg) products which will provide a competitive edge in the existing U.L. market segment.
3. "Best of the Lowest" -- Develop products which utilize proprietary PM technologies, viz., tar reduction, nicotine control, flavor delivery, etc., which will demonstrate consumer advantages via R.G.A. testing.
4. Filter Research and Development.
5. Paper Technology.
6. Flavor Research & Development.

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CAST LEAF

Objectives

1. Develop reconstituted cast leaf products that will provide flexibility in meeting capacity needs for individual sheet types.
2. Optimize current RCB process for physical properties, capacity and environmental goals.
3. Support R&D programs requiring non-standard cast sheet.
4. Support International needs for reconstituted product development/evaluation.

Strategies

1. Evaluate material, environmental, and capacity requirements.
2. Evaluate RCB process effluent and develop process modifications as needed.
3. Conduct work in Cast Leaf Pilot Plant leading to new non-ammoniacal recon product.
4. Evaluate new denitration technology in lab.
5. Cast Leaf Design Package which addresses

Capacity
Special needs
International needs

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NEW EXPANDED TOBACCO

Objectives

1. Develop an expanded tobacco material having more "tobacco-like" subjectives.
2. Reduce degradation to allow for improved product quality and better yield.
3. Reduce CO₂ emissions as compared to DIET.

Strategies

DIET Improvement

1. Assure plug flow, short residence time at tower infeed.
2. Provide uniform gas-tobacco distribution in the tower.
3. Eliminate separator recycle.
4. Provide plug flow discharge from separator with proper residence time for thermal treatment.
5. Determine if fundamental degradation principles identified in the initial clump-free DIET development apply in the Australian DIET plant.
6. Reduce degradation from impregnator discharge to vibrating grid.
7. Evaluate potential of gas impregnation and, if applicable, determine modifications to current DIET process design to allow for future use.
8. Evaluate existing DIET pilot plant instrumentation and modify as required to provide for adequate and efficient data evaluation.
9. Support design of gaseous batch impregnation process.

Continuous Impregnation Process

1. Develop a tobacco precooling process for batch and continuous gaseous impregnation.

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2. Determine conditions of tobacco impregnation with gaseous CO₂ over a pressure range of 200 to 900 psi.
3. Develop, design and fabricate process equipment for a continuous impregnation pilot process.
4. Install and test a pilot system for a continuous gaseous impregnation process.
5. Develop, design, and fabricate a continuous impregnation process utilizing a linear-pocket feeder system.
6. Investigate and evaluate the possibility of inert gas impregnation.
7. Determine the effect of filler casing on gaseous impregnation.
8. Evaluate the degree of subjective improvement associated with gaseous impregnation.
9. Determine the physical and/or chemical forms the impregnant takes within the tobacco.
10. Quantify the sorption properties of the substrate at equilibrium.
11. Quantify the sorption properties of the tobacco substrate under dynamic conditions.

Alternate Puff/Dry/Set Techniques

1. Determine conditions for optimum puffing.
2. Determine mechanisms which are responsible for collapse in or exiting the expansion tower.
3. Determine the process/product parameters which control product setting.
4. Define the role and mechanism of stiffening in determining product quality.
5. Define expanded product quality measures which translate directly into cigarette quality measures.

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6. Determine if cooling tobacco after expansion/setting improves subjectives with no negative impact on product physical characteristics.
7. Implement the defined processing steps/parameters in pilot expansion process.
8. Optimize and evaluate the processing schemes.

High Capacity Processes for Partial Expansion of Tobacco

1. Review and summarize previous work.
2. Identify potential processing schemes and test concepts with existing equipment, lab evaluations, and/or vendor tests.
3. Construct a pilot development facility.
4. Determine the relationship between processing conditions and subjective/physical properties for each tobacco type (bright, burley, oriental).
5. Compare the effect of blend expansion in various combinations with the expansion of individual blend components on subjective/physical properties.
6. Determine the contribution of DIET and ES components to subjective/physical properties both as standard expanded products and as included in partial expansion.
7. Analyze blend similarities and production requirements for all brands.
8. Propose one or more processing schemes for detailed physical, chemical, subjective, and economic evaluation.

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LOWERED BIOLOGICAL ACTIVITY

Objective

To decrease the activity of cigarette smoke condensate (CSC) by 90%, relative to 2R1 CSC, as determined by multiple *in vitro* assays.

Strategies

1. **Bioassay Development:** Establish *in vitro* bioassays which can differentiate among CSCs from various model cigarettes.
2. **Model Development:** Prepare model cigarettes designed to reduce biological activity.
3. **Model Evaluation:** Test CSC from new model cigarettes.
4. **Model Optimization:** Improve the subjectives of a low activity model.
5. **Information Survey:** Gather information from the outside scientific community relevant to biological activity.

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TSNA

Objectives

1. To design a first generation laboratory model of a product by 1991 with MS TSNA (TSNA/mg TPM) delivery reduced 90% relative to the TPM-corrected TSNA delivery of a 1987 full-flavored, blended cigarette.
2. To design a second generation laboratory model of a product by 1993 with MS TSNA delivery (TSNA/mg TPM) delivery reduced 95% relative to the TPM-corrected TSNA delivery of a 1987 full-flavored, blended cigarette, utilizing technology based on a fundamental understanding of NA formation.

Strategies

Reduction of MS TSNA By Reducing Preformed TSNA & Pyrosynthetic TSNA Precursors in Filler

1. Reduce MS TSNA by selective removal of TSNA, amine precursors, and/or nitrosating agent precursors from filler.
2. Reduce MS TSNA by biochemical alteration(s) to tobacco leading to removal of alkaloid precursors of TSNA.

Reduction of MS TSNA By Inhibiting the Pyrosynthesis of TSNA

3. Reduce the levels of pyrosynthesized MS TSNA by incorporation into the cigarette design those aspects of oriental filler which result in an absence of significant TSNA pyrosynthesis from oriental tobacco.
4. Reduce the levels of pyrosynthesized MS TSNA by decreasing the reactivity to nitrosation of the amine precursors, or blocking reaction pathways which form nitrosating agents or which yield TSNA from the nitrosating agents.

Reduction of MS TSNA By Enhancing Decomposition of TSNA

5. Evaluate the enhancement of TSNA decomposition during smoking as a method for reducing TSNA delivery.

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Reduction of MS TSNA By Altering Physical/Chemical Parameters of Cigarettes

6. Reduce the levels of pyrosynthesized MS TSNA by alterations in cigarette construction parameters.
7. Reduce the levels of pyrosynthesized MS TSNA by manipulation of filler salt content.
8. Reduce the levels of pyrosynthesized MS TSNA by manipulation of casings typically used in cigarettes but missing from the reference cigarette.

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